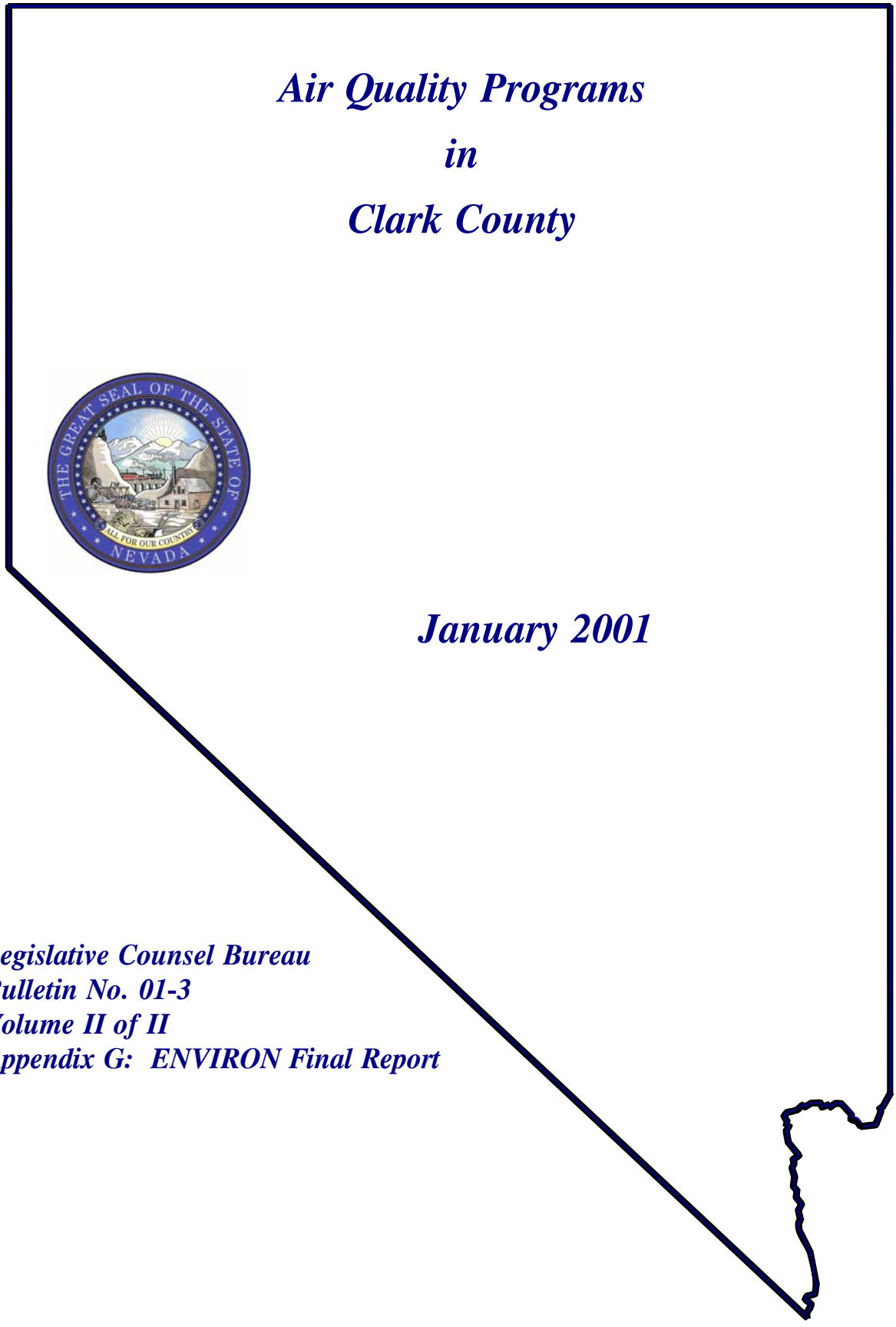
Air Quality Programs
in
Clark County



January 2001

Legislative Counsel Bureau
Bulletin No. 01-3
Volume II of II
Appendix G: ENVIRON Final Report

ENVIRON

Final Report

STUDY OF AIR QUALITY PROGRAMS IN CLARK COUNTY, NEVADA

PURSUANT TO SENATE BILL 432 (Chapter 529, Statutes of Nevada 1999)

Prepared for

Legislative Counsel Bureau
401 S. Carson St.
Carson City, NV 89701-4747

Prepared by

ENVIRON International Corporation
101 Rowland Way, Suite 220
Novato, CA 94945
415 899-0700

September 29, 2000

ENVIRON

28 September 2000

Donald O. Williams
Nevada Legislative Counsel Bureau
Legislative Building
401 S. Carson Street
Carson City, NV 89701-4747

Subject: SB 432 Final Report

Dear Mr. Williams:

The Final Report required under our contract pursuant to SB 432 is enclosed. We are providing one original, unbound, color reproducible copy herewith. We are also sending an electronic copy to you by way of email.

First and foremost, let me thank you and your staff, especially David Ziegler, for providing much valued insight and comment throughout this project, and most notably during the development of this final report. Secondly, I want to take this opportunity to thank the Subcommittee and Chairman Sen. Porter, for their courtesy and professionalism throughout this effort. Their questions and comments at each of the hearings helped to guide us to assure that we were providing information that would be most useful in a reasoned decision-making process. Lastly, I want to acknowledge both the LCB and the Subcommittee's respect for this consultant's independence. At no time during this project did I feel that either LCB or the Subcommittee tried to "lead" us to any conclusion or recommendation. Thus, ENVIRON and its subcontractors take full responsibility for the accuracy of the information we present in this report, as well as our interpretations of the information that we developed or gathered, and the resulting recommendations.

We received a substantial amount of comment material on each of the reports and compendiums we have produced over the course of this project. I and other team members have read all those comments. As we note in the report, we were unable to address all comments on an individual basis. We did however make sure that factually based comments that had an effect on our recommendations would be fully considered in our report. The final report reflects this. Having said this, I must also point out that the comments received, in the aggregate, did not significantly alter the overall content of our recommendations.

We are pleased that the Subcommittee hearings, and earlier versions of this report, have initiated an apparently productive dialog in the Las Vegas region likely leading toward the formation of a regional air quality management entity. Although that process is still evolving, we have used the information currently available from that process in this final report. We have indicated where the proposed structure and implementation of this effort is consistent

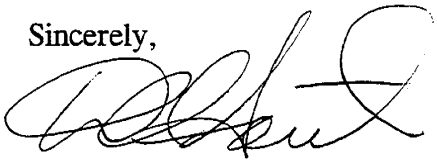
with our recommendations and where we believe it may need more attention. We also note with satisfaction the conscientious involvement of the State of Nevada Division of Environmental Protection as put forth in testimony by Allen Biaggi at the Subcommittee's hearing on September 18, 2000. Other activities, such as the new discussions between the USEPA and Bureau of Land Management and sensitivity to local particulate air pollution issues, also indicate an improved attention to the air quality concerns of the Las Vegas region.

As I stated at one of the Subcommittee hearings on this project, it is my hope that this report will continue to serve as a reference document for those responsible for effecting change in the Las Vegas region. While much attention has focussed on the portions of our recommendations that are organizational in nature, there is a large amount of useful technical information contained in this report that should be used as a point of departure for improving the technical basis of air quality management decision-making in the area. Indeed, many of the comments we received indicated technical areas of disagreement that should serve as good indicators of where additional work should be done.

Although this report completes the bulk of the ENVIRON effort under this contract, we stand ready to assist the Subcommittee and the State Legislature as needed in the forthcoming session.

I am absolutely convinced that SB432 and the Subcommittee's activities will lead to a better air quality management process in the Las Vegas region. Properly implemented, this will lead, in turn, to continued air quality improvement and healthy air quality for all citizens of the area. I am proud that this report may play a part in that result.

Sincerely,



David R. Souten
Principal
Project Manager

cc: D. Ziegler

Enclosure

Final Report

STUDY OF AIR QUALITY PROGRAMS IN CLARK COUNTY, NEVADA

PURSUANT TO SENATE BILL 432
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1. INTRODUCTION, BACKGROUND, AND SUMMARY RECOMMENDATIONS

As required under Senate Bill 432, ENVIRON and its subcontractors and consultants submit this Final Report of the Study of Air Quality Program in Clark County, Nevada.

INTRODUCTION AND BACKGROUND

With the enactment of Senate Bill 432 (Chapter 529, Statutes of Nevada 1999), the 1999 Nevada Legislature directed the Legislative Commission to appoint a subcommittee of legislators to carry out an interim study of the programs for air quality control in Clark County. Senator Jon Porter serves as chairman of that subcommittee, the Legislative Commission's Subcommittee on Air Quality Program in Clark County.

As part of its responsibilities, the subcommittee was directed to contract with a qualified, independent consultant to conduct a study of air quality in Clark County. The consultant's study must include an analysis of and recommendations concerning the following:

- Assessment of current air management programs
- Evaluation of the likely future of the air quality in the area, and efforts that may improve air quality
- Analyses of the funding levels provided for air quality management in the Las Vegas Valley, and options for improvements of the funding levels or mechanisms
- Evaluation of the effectiveness of current regulatory and planning agencies' efforts in improving air quality and the development of recommendations for improvement
- A summary of the findings and recommendations for use by the Nevada Legislature in implementing the recommendations through state legislation

ENVIRON International Corporation, along with several subcontractors and independent consultants, was selected and contracted to carry out this study.

Senate Bill 432 required the submittal of a written report by the end of June 2000, a final report by September 29, 2000, and also requires the subcommittee to review the report on or before October 15, 2000. Lastly, the bill requires the Legislative Commission to submit a report of the subcommittee's findings and recommendations to the 2001 Legislature. This Final report is in response to comments received on the June 2000 written report mandate.

The impetus for SB 432 and this work is a continued concern that has been expressed over recent years that the air quality program for the Las Vegas Valley/Clark County area has critical shortcomings. In the very recent past, this has been of further concern because of U.S. EPA disapproval of the State Implementation Plan (SIP) for attaining and maintaining the National Ambient Air Quality Standards (NAAQS) and thus the jeopardizing of federal

highway funding to the Las Vegas region. This concern has been expressed by citizens, some agency personnel (but not necessarily representing the official position of the agencies in which they are employed), and state legislators. Most generally, the question raised is "Can we do things better in this region, thus assuring continued economic development, clean air, and federal approval of air quality planning in the area?" In short, the answer reported here is "yes".

In carrying out the evaluation reported here, ENVIRON, in collaboration with the Legislative Counsel Bureau (LCB), sought significant agency and public input. The SB 432 Subcommittee also held hearings during the course of the project, reporting on the progress, releasing interim reports, and allowing further public input. At these hearings, ENVIRON presented the interim results of the ongoing study. Lastly, ENVIRON and the LCB released draft reports that reported on the four (4) central topic areas of the study, as well as a summary document.

Carrying out this work in such a open public fashion was a conscious decision. Considerable suspicion of public agency actions in the Las Vegas area in air pollution planning and control had been voiced in recent years. Thus, it was believed to be important for this project to be carried out as much in the "public eye" as possible.

Carrying out this work in such openness has its difficulties. Nearly everyone has a story to tell, and it is the challenge of the consultant to acknowledge the desire to reflect all facts and views while also recognizing the critical necessity for objectivity in using those views, opinions, and facts. While considerable time was spent in this study interviewing public and private entities and individuals, well beyond that envisioned in the original project scoping, there will certainly be a residual belief among all stakeholders that more information could have been presented if only asked for. Perhaps the best measure of success in a study of this kind is that each stakeholder, whether public or private, has voiced concern that the study inadequately addressed *their* view of circumstances, and that it over emphasized *other's* views of circumstances. It would thus appear that the study has indeed struck the desired balance of representing all views equally.

This study is a "critical" review by its very nature. It is intended to describe what is good and what needs improvement in air quality management. Like a student reading a report card, the agencies that are reviewed are oriented to look for marks lower than they expected and offer reasons why those marks are not warranted. Carrying this analogy further, the "B" students wonder why they didn't get an "A", and the "C" students wonder why they received any "D's". While this report clearly has limitations (due to necessary resource constraints) , none of the comments that have been received on earlier report drafts distract from the main theme of this report: Significant organizational improvements are needed to effect a long term, productive, air quality program that has the public trust. Another way of looking at this is that the public debate that brought forth SB 432, this study, the past and continued U.S. EPA disapproval of air quality plans in the Las Vegas region, and the jeopardizing of federal highway monies, as well as very recent re-organizational proposals being put forth by local elected officials, all suggest that something significant needs to be done.

Due to the aggressive schedule for this study, the public at large, and public agencies in particular, were asked in some cases to provide review comments on draft reports with, in

some cases, less than 2 weeks of review time. Further, some comments were received after that time period, reducing the time available to fully address those comments in this Final Report. As a result, the report does not necessarily explicitly address those comments in the main text. All comments received have been read, and where such comments would change the character of the results reported herein, we have made such adjustments. This report includes a copy of all formal comments received, as well as a list of both formal comment providers as well as informal comment providers, in the appendices.

Although the comments that have been received do not, in our opinion, change the basic conclusions of this study, some refinement of supporting observations may be in order, and should be examined further. In fact, it may be useful to the Subcommittee to have a "point-counterpoint" written discussion regarding all formal comments that have been received. The extent to which this can be carried out will have to be examined in light of the resource limitations of this study. In all communications with those wishing to offer comments, the consultant team made clear the fact that the Subcommittee will receive comments throughout its review of this report.

One part of this effort has garnered most of the public press: the recommendation for a reorganization of the institutional structure for air quality management in Clark County. However, as some of the commentors made clear, reorganization *per se* does not assure successful air quality management. We therefore hope that other portions of this report, which are much more technical in nature, are carefully reviewed and used to reflect on some of the specifics that should be addressed by the recommended new air quality planning agency. A point made in comments submitted by the Department of Comprehensive Planning underlines this: before any of the air pollution control measures or programs that we have described in Chapter 2 are implemented, a careful evaluation of the need for such additional emission control must be carried out. This is exactly the purpose of the State Implementation Plan required under the Clean Air Act to be submitted to the U.S. EPA. Such a plan provides the framework within which all potential control measures or other practices may be evaluated for both cost and effectiveness in attaining and maintaining the NAAQS.

ORGANIZATION OF THIS REPORT

Following this introductory section, we present a summary of observations and recommendations for consideration by the SB 432 Subcommittee. This is followed by Chapters 2-5, which, respectively, report on: assessment of current and future air quality; identification and evaluation of potential future air pollution control measures; current and future funding requirements for air quality programs; and governmental roles and responsibilities.

The report contains several appendices. Including a list of all persons/agencies interviewed, past studies reviewed, listing of commenters, formal comments received on draft reports, and presentations made by ENVIRON at SB 432 Subcommittee hearings.

SUMMARY RECOMMENDATIONS

In this section we present a summary compilation of the information presented in more detail in subsequent sections of this report. We do this by first presenting, very briefly, our overall observations and recommendations. This is then followed by a more complete section-by-section listing. Readers interested in yet more detail are then directed to Chapters 2-5.

Overall Issues Identified

- The monitoring of pollution levels in the atmosphere (air quality monitoring) is improving, but additional work has yet to be done.

- Research products are generally good, but are not well coordinated among sponsoring agencies, resulting in less than optimal use of research funds and a lack of effective long-term focus of research activities.

- Enforcement of existing air pollution reduction programs is improving, but more improvements are clearly needed.

- Air pollutant emissions inventories, which are critical to proper decisionmaking, need to be much improved and organized.

- Public outreach of air pollution program information needs to be improved, especially through the use of wide-spread internet access to air pollution related program material, including emissions inventories, air quality, enforcement activities, research plans and project descriptions, and proposed and adopted pollution reduction strategies and State Implementation Plans.

- The Las Vegas area is identified by the U.S. EPA as exceeding both the particulate and carbon monoxide NAAQS.

- The area is also very likely exceeding the proposed 8-hour ozone NAAQS.

- Inadequate data exists to either support or dispel public perception of deteriorating visibility (increased regional haze).

- Significant improvements have occurred in ambient levels of carbon monoxide, and attainment of that NAAQS is likely in the very near future.

- Air quality plans for attaining and maintaining the NAAQS for CO, PM-10, and ozone (due to the new standard) need to be done much better than in the past.

- Accurate population projections, which are fundamental to future air quality planning, have been inconsistent and poorly reconciled in the past, but have very recently been apparently resolved.

- Many regulations limiting air pollution emissions, in effect elsewhere in the U.S., could be effective in reducing the ambient concentrations of pollutants in the Las Vegas area. The evaluation of the need for such regulations should be carried out within the framework of effective air planning for State Implementation Plans for attaining and maintaining the NAAQS.

- There is considerable inter- and intra-agency stress, especially within the Air Quality Division of the Clark County Health District and between the Air Quality Division and Comprehensive Planning; this results in significantly reduced public confidence and reduced effectiveness in program administration. Roles, responsibilities, and authority between these two agencies is not optimal.

- The Regional Transportation Commission (RTC), which was renamed in September 2000 as the "Regional Transportation Commission of Southern Nevada," functions effectively in providing air pollution related transportation information to other regulatory agencies, and is a major stakeholder in State Implementation Plan submittal and approval by U.S. EPA.

- Resources for air pollution management in Clark County are lower than optimal, especially when compared to agencies elsewhere with similar air pollution challenges.

- Additional financial resource opportunities exist, in line with similar allocations in other U.S. cities.

Overall Recommendations

- Improved ambient monitoring of air pollutants, both for existing and likely future air pollution problems

- Improved air pollutant emissions inventories

- Improved public accessibility to air pollution program data and other information

- Better process for timely and technically acceptable development of State Implementation Plans to be submitted to the U.S. EPA

- Better, more comprehensive evaluation of the need for, and nature of, additional emissions reduction measures, especially for ozone, PM, and regional haze

- Improved research coordination and resource use optimization

- Better, more consistent enforcement of existing regulations

- Retention of RTC in its current role

- Elimination of Air Quality Division of the County Health District, and elimination of Clark County Department of Comprehensive Planning's air management functions

- Consolidation of air pollution programs through the formation of a single-agency for air quality program management

DETAILED SUMMARY BY CHAPTER

Chapter 2 – Assessment of Current and Future Air Quality in Clark County

Air Quality Monitoring Program

- Volatile Organic Compounds (VOC) monitoring should be added, as this is one of the two (the other being oxides of nitrogen (NOx)) pollutants that contribute to ground-level ozone.

- Carbon monoxide (CO) monitoring is generally adequate, but some specific improvements are suggested.

- Additional particulate matter (PM_{10}) monitoring may be necessary because of population growth patterns, as well as for a better definition of background PM_{10} concentrations.

- Fine particle ($PM_{2.5}$) monitoring is just beginning, and chemical speciation of future samples is recommended.

- Visibility monitoring, and related meteorological monitoring, needs to be significantly improved. Current efforts by the Clark County Health District (CCHD) should contribute to those needed improvements, but additional recommendations are made.

- Ozone monitoring has recently been expanded and has shown heretofore previously undetected elevated levels of ground level ozone. Future growth patterns may well alter the location of future ozone maximums, and numerical simulation models, as well as other data, should be used to assess future likely locations for ozone monitoring needs.

- Meteorological monitoring should be augmented to collect upper-air meteorological data over the Las Vegas Valley.

- Air quality data reporting, quality assurance, recordkeeping, and ready public access should be improved.

- Significant ambient monitoring program improvements were made between 1991 and 1996.

Population, Vehicle Activity, and Economic Growth Projections

- Considerable controversy over population growth projections has very recently been resolved, resulting in population projections methods and figures that are probably as good as can be expected.

- Travel projections, and thus vehicle miles traveled (VMT), are being made using state of the science projection techniques, and generally agreed upon input data.

Emissions Inventory

Stationary and area sources: there are overall significant shortcomings in the area and point source inventories:

- Better QA/QC is warranted
- Seasonal emissions distributions should be addressed
- Emissions factor use should be standardized and audited
- Database organization should be improved
- PM_{10} micro-inventories have improved significantly, and additional work is likely necessary
- NDEP emissions inventory for utility boilers should be re-assessed
- Future year inventories will be flawed to the degree they are based on current inventories

On-road mobile sources

- ENVIRON developed revised on-road inventories for this project. The methods used in this study should be used in current inventory efforts by local agencies
- Future assessments should certainly use evolving and updated computer models for all on-road emission estimates
- The majority of VOC and CO emissions are clearly from light duty on-road mobile sources
- In contrast, heavy duty diesel powered vehicles represent a major source of on-road N0x emissions
- Exhaust PM_{10} is dominated by heavy-duty diesel sources

Off-road (aka "non-road") emissions

- ENVIRON developed an emissions inventory for this source category under this project
- Until better methods become available, we recommend that this ENVIRON methodology be used in the Las Vegas region
- This category of emissions is important and has historically been neglected

- Emissions are significant for VOC, CO, N0x, PM_{10} (as well as $PM_{2.5}$)

Assessment of Current Local Control Programs

Stationary sources

- Scope of stationary source control measures adopted by the Heath District is not far-reaching in comparison with program adopted by other similarly-sized nonattainment areas in the country.

- Two exceptions: 1) regulations directed to visible emissions limitations, which are more restrictive than typical state and federal requirements and, 2) chlorine emissions limitations.

- Heath District permitting analyses generally fail to comply with the EPA guidance on "Best Available Control Technology" (BACT).

- Emissions factors used are inappropriate, leading to errors in base case emissions inventories, future inventory projections and planning needs, and possible incorrect enforcement of emissions limitations.

- Manpower and office space allocation for permit writers is inconsistent with an efficient program.

- Enforcement staffing and activity is substantially less than in other similar southwestern urban areas.

- Enforcement is fraught with Heath District internal staff and management disagreements.

Area source permitting

- Need improved QA/QC

- High applicability, but questionable enrollment

- Marginal manpower allocation for enforcement activities (similar to point source issue)

- Very sophisticated construction activity enforcement program

- Less effective gasoline service station emissions enforcement program

- I/M program is moderately successful. Meaningful program improvements are possible

- Significant VOC and CO emissions reductions result from the winter gasoline formulation requirements

Future Air Quality

- Likely continued attainment of 1-hr ozone standard in near future
- Likely exceedance of 8-hr ozone standard currently and in future
- Likely attainment of CO standard in near future and maintenance in near term thereafter
- PM_{10} exceedance is likely to continue without the adoption of additional controls, and development and approval of a revised State Implementation Plan (SIP)
- Notwithstanding general public concerns, haze (regional visibility) issues are not yet quantifiable due to limited ambient measurement data. Current efforts by the Health District should significantly improve the available database.

Chapter 3 - Identification and Evaluation of Potential Future Air Pollution Control Measures

Summary

- Purpose: Identification and explanation of possible air pollution reduction measures
- A meaningful evaluation of additional stationary source controls is not possible, nor advisable, until underlying issues in emissions inventories and enforcement efforts are resolved
- Area source emissions controls for fugitive dust sources is both possible and likely necessary for attainment of the NAAQS
- Approximately 40 emissions measures were evaluated
- VOC, N0x, CO, and particulate matter were all addressed
- Cost and emissions reduction potential are considered
- "Ideal" mix of measures is responsibility of local, regional, state and federal agencies, not this study
- Some subset of the measures examined, as well as others, are likely to be needed to assure attainment and maintenance of the current and proposed National Air Quality Standards (NAAQS) for ozone, particulate matter, and carbon monoxide
- Air pollution related research carried out in and for the Las Vegas region should be better coordinated among sponsoring agencies, should be examined with the objective of improving research productivity and focus, and should be better documented in an on-going basis available for public and scientific peer review use and review (e.g., via WWW and periodic technical workshops).

- The following measures are evaluated in this chapter:

  - Adopt CA Standards for Large (>25HP) Spark-Ignition Off-Road Engines
  - Reduce Summer RVP – Off-Road
  - Retrofit of Existing HDDVs with SCR
  - Earth Berm Along Edge of Open Area for Fugitive Duct Control
  - Paving of 8-ft. Shoulder to Control Fugitive Dust from Paved Roads
  - Stabilization of PM from Unpaved Roads, Alleys and Easements
  - Reduce Summer RVP – On-Road
  - Covering Soil Surface of Unpaved Parking Lots with Aggregate
  - Asphalt Concrete Over Unpaved Parking Lots
  - Road Side and Periodic Smoke Inspection for On- and Off-Road
  - Paving 4-ft./Aggregate on 4-ft. Shoulder for PM Control at Paved Roads
  - Fencing for Fugitive Dust from Open Areas and Vacant Lots
  - SCR Retrofit – Off-Road
  - Low Emissions Diesel Engine Repowering for HDDVs
  - Improved I/M – Centralized Testing
  - Natural Gas Retrofit for HDDVs
  - Improved I/M – Centralized Testing+IM240+Evap System Testing
  - Scrappage Program
  - CATMATCH TCM
  - Diesel Fuel/Water Emulsions – Off-Road
  - California Phase 3 RFG – Off-Road
  - Oxidation Catalysts for Off-Road Engines
  - Natural Gas Vehicle Fleet Rule – Lt. Duty Trucks (8.3 RVP)
  - California Phase 3 RFG – On-Road
  - Natural Gas Vehicle Fleet Rule – Lt. Duty Trucks (7.0 RVP)
  - Natural Gas Vehicle Fleet Rule – Passenger Cars (8.3 RVP)
  - California Diesel Fuel – On-Road
  - Diesel Fuel/Water Emulsions – On-Road
  - California Diesel Fuel – Off-Road
  - Natural Gas Vehicle Fleet Rule – Passenger Cars (7.0 RVP)
  - Accelerated Purchase of Cleaner Diesel Engines – Off-Road
  - CA LEV II Emissions Standards
  - Fleet Rule – Buy Natural Gas HDDVs
  - Parking Price Increase TCM
  - Retrofit of Existing HDDVs with PM Traps
  - Particulate Trap Retrofit – Off-Road
  - Ultra Low Sulfur Diesel Fuel – Off-Road
  - Visitor Programs TCM
  - Ultra Low Sulfur Diesel Fuel – On-Road

Stationary Sources

VOC emissions controls may be appropriate in the following areas, but need to be more fully explored specifically for applicability and cost/effectiveness in the Las Vegas region: wastewater separators, pumps and compressors, valves and flanges, pressure relief devices, asphalt air blowing, spray coating operations, paper coating operations, plastic coatings, foam manufacturing, and adhesive applications.

N0x emissions controls for smaller boilers, stationary IC engines, process heaters, and cement kilns may prove beneficial.

Some moderate PM emissions reductions may be obtained from stationary sources through the use of a particulate limitations on certain industrial source categories.

Additional reductions in emissions is possible through the improvement in the existing permitting rules and policies associated with the Clark County Emissions Reductions Credits program.

Area Sources

PM emissions from area sources of fugitive dust are amenable to additional controls.

Two programs are described in detail for fugitive dust from disturbed vacant areas.

Previous research indicates that the application of vacant land fugitive emissions controls need only be done on a selective basis, as exceedances of the PM_{10} standard appears to be most severely impacted by sources within 0.5 km of the exceedance area.

Implementation of dust control measures for unpaved roads appear to provide the potential for reducing PM_{10} emissions cost effectively.

Two potential control measure for PM_{10} are examined for unpaved parking lots. Both warrant additional assessment for cost effectiveness.

ENVIRON examined another currently proposed measure, for the control of PM_{10} emissions from paved roads. Again, emissions reductions appear to be reasonably cost effective.

Currently proposed construction activity emission reduction measures have been proposed. Although directionally correct, some improvements are suggested.

As is the case for stationary sources of VOC and N0x, area source emissions of these pollutants offer additional opportunity for emissions reduction. While these source categories have been regulated elsewhere in the U.S., the applicability, emissions reduction potential, and cost effectiveness specific to the Las Vegas area should be examined. Examples include:

Cutback asphalt, emulsified asphalt, marine coating, pleasure craft coating, metal parts coating, solvent degreasers, architectural coatings, aerosol coatings, graphic arts, commercial

bakery ovens, decontamination of soil, natural-gas-fired central furnaces, asphalt pavement heaters, residential water heaters.

On- and Off- Road Mobile Sources

The following listing summarizes emissions reduction measures that have been examined and/or implemented elsewhere in the U.S., have been evaluated in this report, and may have applicability in the Las Vegas region.

- New federal Phase 2 emission standards for small gasoline engines used in off-road applications;
- Adoption of the California LEV II program for on-road vehicles;
- Accelerated purchase of low-emission diesel engines for off-road equipment;
- Electrification of airport ground support equipment; and
- Adoption of California emission regulations for large spark-ignition engines used in off-road equipment.
- Improvements to the Clark County I/M program;
- Smoke inspections for on- and off-road diesel engines;
- Accelerated retirement of older on-road vehicles;
- Repowering of existing on-road heavy-duty diesel vehicles with cleaner engines;
- Retrofit of particulate traps on on- and off-road diesel vehicles;
- Retrofit of selective catalytic reduction systems on on-road diesel vehicles; and
- Transportation control measures reducing the operation of on-road vehicles.
- Reducing summertime gasoline volatility;
- Requiring the use of California Phase 3 gasoline;
- Requiring the use of California diesel fuel;
- Requiring the use of "ultra-low" sulfur diesel fuels;
- Requiring the use of diesel fuel/water emulsions; and
- Requiring the purchase of new natural gas powered light-duty vehicles for use in fleet operations.

Chapter 4 – Current and Future Funding Requirements for Air Quality Programs in Clark County

Summary

In this chapter, we review the current funding sources for air pollution and transportation programs in Clark County and then examine funding sources used by other air pollution control agencies throughout the U.S. Special emphasis is given to the nationally recognized California program which combines State and local agency efforts to fund the implementation of air quality programs to achieve that state's very adverse air pollution problem. We then report on the findings from a series of interviews regarding funding that were conducted with numerous stakeholders in the Las Vegas air pollution program. Criteria to examine potential new revenue sources are suggested and used to evaluate our recommendations in Task 3. Finally, we suggest three major recommendations on how to provide funding for the proposed programs later identified in Task 4, as well as suggest additional areas to examine in the future for potential revenues to support air pollution programs in the Las Vegas Valley.

Findings and Recommendations

- Current funding, especially for those programs identified in this study to have significant shortcomings (e.g., enforcement, permitting, emissions inventory development, ambient monitoring, and air strategy regulatory development), is likely inadequate.

- In comparison to other regions in the U.S. with similar air pollution issues and regional size, it appears as if both the total funding to the program area in Clark County, as well as the salaries paid, are lower than is appropriate for the challenge and responsibilities.

- Reorganization of the management of air quality in Clark County, as discussed in a companion report in this project (Task 4), will likely result in more efficient use of existing funds.

- Permit fees in Clark County appear to be abnormally low as compared to fees for similar sources located in other areas with air pollution issues. It is recommended that permit fees should be established that are comparable with those set by like-sized agencies in adjacent states, for both existing sources and new sources of air pollutants

- The smog check program is funded from inspection fee revenues. The program should be revised to increase the fees for this program for additional revenue generation for air pollution programming in Clark County.

- The smog check enforcement program should be examined to provide for aggressive enforcement for identifying and prosecuting unregistered vehicles under the auspices of the Highway Patrol and local enforcement officers

- Enforcement penalties should be increased, to a level closer to the norm in other large and growing local air pollution programs elsewhere in the country. A fraction of the increased penalty would be directed to school environmental education programs and/or spent to lessen exposure levels to school children of air pollution from school buses.

- Additional revenue sources should be explored, and include:

    - Encourage US EPA to re-evaluate its funding allocations to assure Clark County gets its fair share
    - Assess a special surcharge at registration for diesel vehicles, based on their pollution potential
    - Examine an annual motor vehicle license plate registration surcharge
    - Review the CMAQ funding projects and assure that they fully implement and support SIP priorities

Chapter 5 – Governmental Roles and Responsibilities for Air Quality Programs in Clark County

Summary

The operation and organizational structure of air quality programs in Clark County is a key to the current and future effectiveness of the programs. The effectiveness of air programs is necessarily dependent upon the effectiveness of the organizational structure and operation of that structure. The organizational structure sets the context for the manner in which air program goals are formed and reached, from the makeup of the governing board or boards to the organizational structure through which communication, policies, and planning flow. However, the success of the programs depends also on the effectiveness of the operation of that structure in the development, implementation, and communication of air goals, policies, and programs. This study has found significant deficiencies in both the structure and operation of Clark County air programs and recommends changes to both.

Recommendation

The recommended consolidation will result in the recommended termination of the Clark County Air Pollution Control Board and the reassignment of certain programmatic functions within the Clark County Department of Comprehensive Planning. The new single agency is tentatively planned to have two members who are elected officials of cities in Clark County, a representative of the Clark County Board of Commissioners, a state agency representative, a representative from the Regional Transportation Commission, one state legislator from Clark County, and one member of the public. The Governor and the Legislature would appoint most of the members of this new board.

The board of the regional agency would oversee functions of the agency, which would be administered by an executive director and would have air pollution planning, compliance/enforcement, research, data management, laboratory, and public outreach functions.

Background

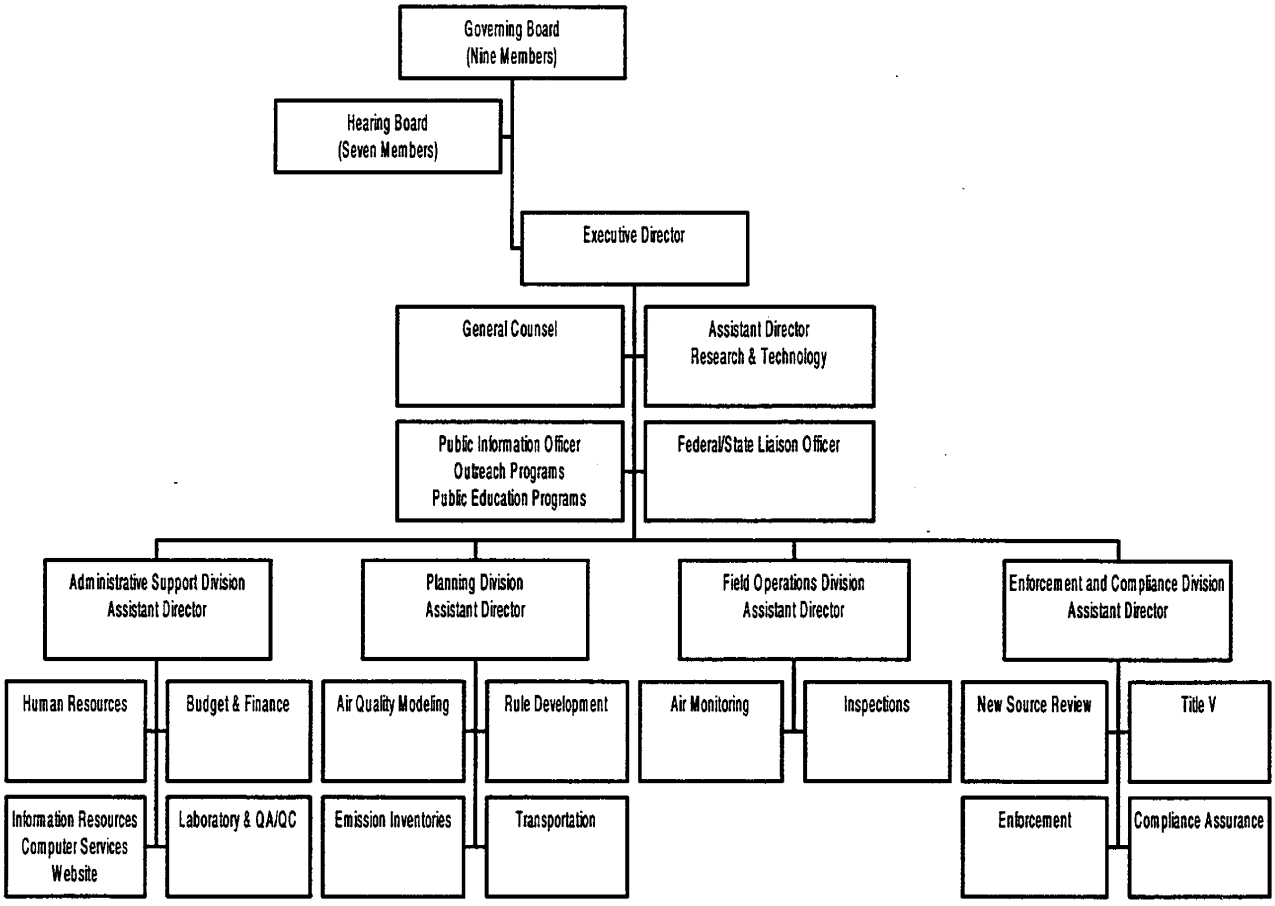
- Several information sources were used in making the recommendations, including: extensive interviews, the results of related task activities carried out under this overall study (Tasks 1-3), other programs of a similar nature elsewhere in the U.S., and the study team (ENVIRON) extensive experience in this area.

- Five (5) alternative structures were considered, ranging from status quo to regional super-planning agency with responsibility for land use, transportation, water quality, and air quality management.

- Intra-agency as well as inter-agency conflicts are counter productive to effective air quality management, and must be eliminated as soon as possible.

- The existing distribution of air planning responsibilities and authorities across agencies is not conducive to collaborative efforts and common goals.

- A suggested agency organization is presented:



- Overall costs of the suggested air quality management program is estimated to be approximately 15% greater than the current program costs.

- Several non-structural recommendations are made, which will be facilitated by the recommended reorganization, these include:

    - Improved working conditions for air management professionals

    - Improved equity in salaries for air management professionals

    - Communications/data access/public outreach should be improved

    - Improved training of technical and support staff

- State of Nevada: the role of the State in assuring the timely submittal of air quality plans to the U.S. EPA should be enhanced.

- Relations with the U.S. EPA should be improved. This is a two-way street, with past communication problems due to both Clark County agency inattention to this issue, as well

as U.S. EPA inconsistent commitment to better communications with respect to development, submittal, and approval of State Implementation Plans. The recommended organization is certainly more likely to facilitate a better U.S. EPA responsiveness to Clark County issues.

2. ASSESSMENT OF CURRENT AND FUTURE AIR QUALITY IN CLARK COUNTY, NEVADA

INTRODUCTION

The Las Vegas area has enjoyed robust growth in population and tourism for many years. Tourists and residents alike are drawn by the many entertainment opportunities, reasonable home prices, the desert climate, beautiful views, recreational attractions, and the promise of clean air. However, the rapid growth may be exacting a toll. Visitors and residents now look across the Valley at often brownish, hazy vistas. Although no official poll has been taken, there appears to be a popular perception that these problems are getting worse and that no one is doing anything about it. While there is considerable uncertainty and disagreement over how bad these problems really are, there can be no doubt that they have the potential to undermine the quality of life in the Las Vegas area. However, if efforts to improve air quality are not informed by careful and objective study, Las Vegas area businesses and individuals could be subjected to unnecessarily high regulatory and financial burdens. The particular challenges of rapidly growing areas include a greater degree of uncertainty about future conditions (such as population or pollutant levels) and more difficulty in appropriately balancing public health and economic vitality.

Given the above, the purpose of this chapter is to provide an assessment of current and future air quality in Clark County as well as the effectiveness of local air pollution control measures which are already in place. The remainder of this section provides background information related to Clark County and its air pollution problems. Subsequent sections address current air quality in Clark County, emissions levels from the different types of pollution sources in Clark County both now and in the future, the effectiveness of current local control programs to reduce air pollution, and finally future air quality in Clark County in the absence of additional local control programs.

CLARK COUNTY OVERVIEW

Clark County is a political subdivision of the State of Nevada, established in 1909 and operated under the provisions of the general laws of the State. The Clark County seat of government is the City of Las Vegas. The County is comprised of 7,927 square miles and includes the cities of Las Vegas, Henderson, North Las Vegas, Boulder City and Mesquite. There are also thirteen unincorporated towns.

Clark County's 1999 population was officially estimated at 1,321,319 (more than 60% of the total state population), and is the most populous of Nevada's 17 counties. In keeping pace with its growth, the County is undergoing tremendous change. Widely reputed by the popular press to be the fastest growing County in the nation, it experiences a unique set of challenges for environmental as well as other issues. Figure 2-1 displays the County as a whole.

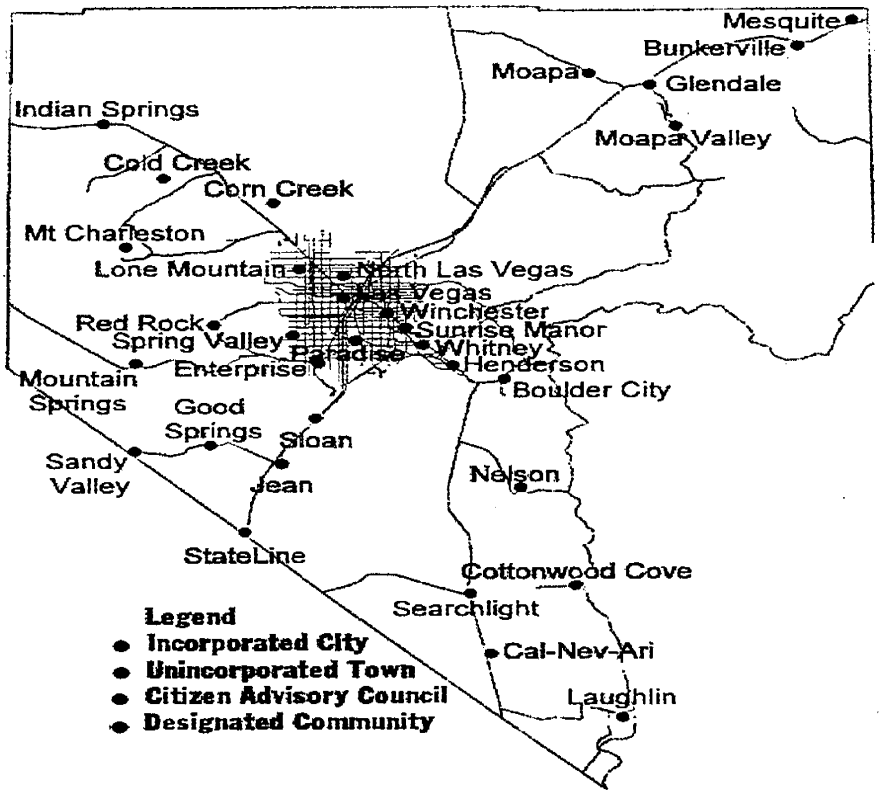


Figure 2-1. Geographic map of Las Vegas and surrounding areas.

The Las Vegas Valley airshed coincides with Hydrographic Basin 212 and the airshed itself contains the cities of Las Vegas, North Las Vegas, and Henderson as well as a number of unincorporated areas comprising roughly 500 square miles and containing 96 percent of the total county population. It extends in a northwest-southeast direction bounded by the Spring Mountains to the west; the Pintwater, Desert, Sheep, and Las Vegas Mountains to the north; and Frenchman Mountain to the east. The McCullough Range and Big Spring Range close the airshed to the south. The Valley drains toward the south and then easterly through Las Vegas Wash to Lake Mead. The upper boundaries of the alluvial apron occur at approximately 4500 feet and are marked by a noticeable change in slope. The lower boundaries of the apron are less well defined due to massive sedimentation on the valley floor, but occur at an average elevation of approximately 2500 feet. The basin lowland levels of the Las Vegas Valley range from 1800 to 2500 feet.

CLIMATOLOGICAL SETTING

The Las Vegas Valley is situated in a sort of "bowl" surrounded by mountains. It is on the edge of the Mojave Desert and has an arid climate typical of the southern Mojave Desert. Due to the "rain shadow" effect of the Sierra Nevada Range and Spring Mountains to the west, moisture associated with storms originating in the Pacific Ocean rarely reaches the Valley. Dry air masses move over the valley resulting in clear to partly cloudy skies with 85 percent sunshine for an average year.

The temperatures range from moderate to very hot. In July, for example, average daily temperatures range from a minimum of 75 to a maximum of approximately 104 degrees. In January temperatures range from an average minimum of 33 degrees to an average maximum of 56 degrees.

Surface meteorology in the Las Vegas Valley is generally characterized by prevailing southwesterly winds with monthly average wind speeds ranging from 7 to 11 miles per hour. Lower wind speeds are prevalent during the winter months with a windy season throughout much of the spring. Winds in excess of 40 miles per hour are infrequent. During these events, periods of wind gusts, blowing sand and dust are prevalent. In addition to prevailing winds, a pattern of local winds, generated by local topography and temperature, also affect the Valley. During the day, as the air mass is heated, wind directions are generally upslope and in a westerly gradient. At night, the wind direction is reversed and cool air drawn from the higher elevations drains to the lower Valley.

AIR QUALITY MONITORING

Ambient pollutant levels in the Las Vegas Valley are measured on year round basis via a monitoring network consisting of approximately 20 sites located throughout Clark County. The primary purpose of this monitoring network is to provide data on pollutant levels which is used to determine whether or not health based air quality standards are being met or violated. These standards are set by federal law and are known as the National Ambient Air Quality Standards. In addition, it can be used to assess levels of non-regulated (also referred to as non-criteria) pollutants and certain toxic air contaminants. While not every monitor measures concentrations of each pollutant, routine monitoring is conducted at least one or more sites in Clark County for the following pollutants:

- Carbon monoxide (CO);
- Particulate matter of less than 10 (PM_{10}) and less than 2.5 ($PM_{2.5}$) microns in diameter;
- Ozone;
- Oxides of nitrogen (NO and NO_2);
- Sulfur dioxide (SO_2);
- Haze/visual range; and
- Ammonia (NH_3), hydrogen sulfide (H_2S), hydrogen chloride (HCl) and chlorine (Cl_2).

AIR QUALITY CONCERNS

At present, the Valley is classified as nonattainment with respect to the National Ambient Air Quality Standards (NAAQS) for carbon monoxide (CO) and particulate matter less than ten microns (PM_{10}) in diameter. In addition, Valley air quality monitoring data suggests that violations of a new NAAQS for ozone that was set in 1997 are likely. However, this NAAQS and another for particulate matter are currently under review in the judicial system.

Visible haze, while composed of small particles (mostly particulate matter less than one micron) that may also cause health problems, represents another Valley air quality problem although it is primarily a quality of life issue. However, visibility is the public's most common measure of pollutant levels, and the brown cloud frequently seen over the Las Vegas skyline creates concern among residents and visitors about the quality of the air and significantly degrades the otherwise pristine views of the surrounding desert and mountain ranges.

Sources of Air Pollution

As is discussed in more detail below, there are a wide variety of sources of air pollutants in the Las Vegas Valley. These sources are generally categorized using the following definitions:

- Stationary Sources – The stationary source category generally includes emissions occurring routinely at fixed locations due to a variety of activities. Examples of stationary sources range from gasoline stations and dry cleaners to stationary engines, power plants, cement, rock and gravel plants and other large scale industrial facilities.

- Area Sources – The area source category generally includes emissions occurring from general activities. Examples include dust emissions from construction activities and high winds, the use of consumer products (e.g. deodorants, hair sprays, etc.) and the use architectural coatings among many others.

- Mobile Sources – One component of the mobile source category is on-road motor vehicles ranging from motorcycles to heavy-duty trucks. The other component is what are referred to as off-road[1] vehicles which includes airplanes, locomotives, tractors, construction equipment, and smaller sources such as lawnmowers and chainsaws.

In addition to the sources described above, air pollutants can also be transported from one area to another by the winds. As discussed below, it appears that at least with respect to ozone that the transport of pollutants from California to the Las Vegas Valley may impact Valley air quality.

[1] "Off-road" and "nonroad" are often used interchangeably for generic vehicular sources.

In addition, pollution emitted in the Las Vegas Valley may be transported to downwind areas where it could contribute to air quality problems, particularly to regional haze and the associated degradation in visibility.

There are a number of approaches that are used to assess the relative contribution of the different types of emissions sources to a particular air quality problem. The simplest of these is use of what are known as emissions inventories. Emission inventories are essentially an accounting tool which contains estimates of the emission rates of various pollutants from the different types of sources in an area. Emission rates are usually expressed in terms of tons per day, but other units such as pounds per hour or tons per year are often used as well. By knowing the magnitude of the emission rate of a given pollutant for a given source and the magnitude of the emission rates associated with other sources, one can approximate the relative contribution of that source to total emissions of all sources or some subset of sources. Emissions inventories usually apply to a large geographical region, but so called "microscale" inventories can be developed for relatively small geographic areas.

The other approaches for assessing the relative contribution of sources are based on air quality models. One type of air quality modeling approach that is used extensively with respect to the allocation of sources contributing to ambient particulate mater levels is known as chemical mass balance (CMB) modeling. In order to use this approach one must have data regarding the detailed chemical composition of particulate matter at one or more monitoring sites of interest as well as data regarding the detailed chemical composition of particulate emissions from the major sources. By selecting certain chemical species as relatively unique "tracers" for given source types, multivariate statistical techniques can be used to apportion the particulate matter observed at a given site to the various sources from which it was emitted.

Another type of air quality modeling approach involves the use of dispersion models which can range from simple models dealing with the plume from a single smokestack to complex regional models capable of dealing with the emissions arising from a large number of sources. The main advantage of dispersion models is that they account for relative emission rates, the temporal and spatial distribution of emissions as well as atmospheric processes (e.g. wind direction and speed, mixing heights, etc.) in assessing the contribution of a given source to ambient pollutant levels at a given location. More complex models also account for chemical reactions occurring in the atmosphere such as the photochemical reactions leading to the formation of ozone and secondary particulate matter.

Carbon Monoxide

As noted above, the Las Vegas Valley is formally classified as a CO nonattainment area by the U.S. EPA. CO is a colorless, odorless gas which decreases the oxygen carrying capacity of the blood, can contribute to headaches, fatigue and respiratory problems. The NAAQS for CO include a one-hour standard of 35 parts per million (ppm) (which has never been exceeded in the Valley), and an eight-hour standard of nine ppm. The highest levels of CO levels occur in the evening hours from November through January due to wintertime inversions that trap cool air under a layer of warm air, preventing air from escaping the valley and allowing CO to build up.

The EPA designated the Valley as a Moderate CO nonattainment area on November 15, 1990. Moderate nonattainment areas were required to implement emission control measures as "expeditiously as practicable" in order to attain the CO NAAQS by December 31, 1995. Clark County was granted a one year extension to demonstrate compliance with the NAAQS, based on improvements in CO levels. However, the Las Vegas Valley was not successful in achieving compliance by December 31, 1996. Consequently, the Las Vegas Valley was reclassified as a serious nonattainment area for CO with an attainment date of December 31, 2000. A deadline of May, 1999 (18 months from the notice publication date) had been set by the CAAA for submission of a control strategy implementation plan demonstrating attainment of the NAAQS for Carbon Monoxide by December 31, 2000. A CO plan was submitted to fulfill these requirements in August, 1999. In response to EPA comments on various issues regarding control measure effectiveness and future CO levels, the plan is under revision and will be resubmitted in the summer of 2000.

Since 1995, there was only one air quality monitoring station registering exceedances of the CO standard. This station, known as East Charleston (recently relocated and re-named Sunrise Acres), is adjacent to converging major transportation corridors named the "Five Points" where three state highways intersect. Additionally, the site is located in a topographic bowl where air pollution often collects. The number of violations at this site has steadily decreased in the past 10 years, and no exceedances were measured in 1999 or the first three months of 2000.

Nearly all areas of the U.S. classified as CO nonattainment areas have found that the majority of CO emissions are due to on-road motor vehicles. The Las Vegas Valley is no different: the 1999 CO plan indicates that more than 86% of CO emissions are attributed to on-road mobile sources in 1996. That plan also indicated that over ten percent are attributed to nonroad sources such as lawn and garden equipment, construction equipment, boats, aircraft, and off-road vehicles and that the remaining three to four percent are from large and small industrial sources.

Particulate Matter

Regulated particulate matter (PM_{10}) pollution consists of very small liquid and solid particles floating in the air composed of dust, metals, smoke, soot and acids. PM_{10} is particulate matter measuring less than ten microns in diameter (about one seventh the width of a human hair). PM_{10} can be directly emitted, or formed from atmospheric reactions. PM_{10} can be inhaled deeply into the lungs and can cause serious health effects; when inhaled, these particles can evade the respiratory system's natural defenses and lodge deep in the lungs, causing or contributing to asthma, bronchitis and other lung diseases, reducing the body's immune system, and aggravating heart conditions.

The Las Vegas Valley is classified as a serious nonattainment area for PM_{10}. The applicable standards include a 24-hour average standard of 150 micrograms per cubic meter of air and an annual standard of 50 micrograms per cubic meter. Currently there are five stations measuring exceedances of the 24-hour standard and one measuring exceedances of the annual standard. It is somewhat difficult to characterize progress toward attaining the PM standard due to recent changes in monitoring practices. Although data is available since 1988, between

1988 and 1994 monitors only operated every six days, while those from 1995 onward operate continuously. Therefore, the measurements before 1995 are not comparable to later ones. Sources of particulate matter in the Las Vegas Valley are dominated by fugitive dust, which includes construction activity, dust from vacant lots and other vacant land, paved and unpaved roads, and unpaved parking lots. A significant amount of PM emissions is also caused by on- and off-road diesel powered equipment and vehicles as well as other sources associated with fuel combustion.

A number of PM plans have been developed and submitted by the Clark County Department of Comprehensive Planning, starting with a 1991 plan; and 1994 Best Available Control Measure Plan, and a 1997 serious area plan. Based on objections to the methods for development of the emissions inventory, modeling procedures and level of rule analysis, the EPA formally proposed to disapprove these plans on June 14, 2000. EPA has not yet taken final action to disapprove the plan, a step which will initiate a sanctions clock potentially leading to loss of transportation funds and initiation of a federal implementation plan by EPA. Meanwhile, the Department of Comprehensive Planning is expecting to hold public hearings in November 2000 on a revised PM-10 SIP, and adopt that plan in January 2001. It will then be submitted, through the NDEP, to the EPA for approval. This new PM plan must demonstrate attainment by the year 2006. Public workshops on the proposed control measures were held in April and May of 2000 by the CCHD.

Ozone

The Valley is currently classified as an ozone attainment area but may be reclassified as being in nonattainment with the 1997 ozone standard if it becomes effective. Ozone is a colorless gas which is not directly emitted, but formed through a series of chemical reactions involving nitrogen oxides, volatile organic compounds and sunlight. Ozone is a pulmonary irritant that affects lung tissue and other respiratory functions, and also weakens the body's immune system. Symptoms of coughing, wheezing, asthma attacks, bronchitis, and accelerated aging are some of the known health effects of ozone. Some studies have also concluded that ozone affects the body's immune system and increases people's susceptibility to respiratory illnesses and other bacterial infections. Ozone also has an adverse effect on materials and vegetation.

The previous ozone standard was for hourly concentrations and set limits at 12 parts per hundred million (pphm). The new standard is a rolling eight hour average of eight pphm. In contrast to the 1-hour ozone standard, ozone concentrations that would constitute violations of the 8-hour standard are far more widespread and persistent throughout the United States than are concentrations which violate the one-hour standard. Like Las Vegas, many other areas which comply with the one-hour standards are likely to be reclassified as in nonattainment with respect to the 8-hour NAAQS. The Las Vegas Valley maintains a limited number of long term monitoring sites at which ozone measurements are taken. Among the newer sites at the western and northern edges of the Valley in particular (as well as some of the older sites), numerous ozone measurements during the summer ozone season for 1998 were at levels that exceed the new standard. A study of the 1998 ozone exceedances suggested that transport of ozone and precursors from Southern California may have contributed to elevated ozone levels during some, but not all, of the Las Vegas episodes.

Sources of nitrogen oxides and organic precursors include motor vehicles, nonroad vehicles such as construction equipment or recreational vehicles, consumer devices such as lawnmowers, consumer products, stationary sources (industrial, residential and commercial), and biogenics (volatile organic compound emissions from trees, sagebrush or shrubbery).

OVERVIEW OF EXISTING AIR POLLUTION CONTROL PROGRAMS

As the control of air pollution is a concern throughout the country, laws, regulations and control programs exist at the federal, state, and local government levels. It should be recalled however, that the federal Clean Air Act is ultimately the point of origin for all air quality related activities in Clark County. With respect to the control of emissions from stationary and area sources, federal regulations require that Clark County impose controls on emissions from these sources. This function is handled primarily by the Clark County Health District (CCHD) whose activities involve source permitting, adoption of regulations limiting emissions from stationary and area sources, and the enforcement of permit requirements and regulations.

With respect to on- and nonroad mobile sources, there are a wide range of existing control programs. There are two basic ways in which emissions from mobile sources are regulated. The first approach, applied at the federal level, seeks to ensure that emissions from new vehicles and engines meet applicable standards when they are first introduced into commerce. This process is known as new vehicle or new engine "certification" and it requires manufacturers to demonstrate that their products meet applicable emission standards when new and that they can reasonably be expected to continue to do so for a specified period of time or usage in the hands of the purchaser.

In contrast, the second approach seeks to assure that emissions from vehicles and engines do not exceed certain levels during operation in the hands of purchasers. Programs of this type can take several different forms. One type are enforcement programs again conducted at the federal level that involve emissions testing of products being used by purchasers to determine if they are in compliance with their certification emission standards. In these programs, products that fail to meet applicable emission standards must generally be recalled and brought into compliance by their manufacturers.

Another type of in-use program is represented by the Inspection and Maintenance (I/M) programs for on-road vehicles that federal legislation requires states and local governments to operate. I/M programs target vehicles with emissions-related malfunctions, emission systems that owners have tampered with, and vehicles that owners have failed to properly maintain. Depending on the age of the vehicle and the type of emission problem (e.g., a malfunction or tampering), manufacturers or owners must pay for the repairs needed to return emissions to normal levels

In addition to the design of an engine and its emission control system, the properties of the fuel that the engine operates on can be of considerable importance with respect to emissions. This fact has led to the adoption of federal, state and local regulations specifying the composition of gasoline and Diesel fuel as a means of reducing emissions

from engines operating on these fuels. In general, fuel regulations establish limits on specific properties of the fuels marketed by fuel producers. However, another common type of fuel regulation is intended to force the conversion of engines from operation on gasoline or Diesel fuel to operation on "cleaner" "alternative" fuels such as natural gas.

Finally, emissions from mobile sources can be controlled through the implementation of control measures seeking to reduce usage or improve traffic flow. Examples include transportation control measures such as ridesharing or bans on equipment operation during certain periods and traffic signalization improvements.

Specific Control Programs for CO

Federal measures for areas that are classified as nonattainment for CO include:

1. Vehicle manufactures were required to reduce tailpipe emissions; and

2. Alternative fuel requirements were imposed on governmental fleets in regions with a population exceeding 250,000.

In addition, the Clean Air Act requires that moderate and worse (as in the Las Vegas area) nonattainment areas implement the following controls for CO:

1. An oxygenated gasoline program during the winter months that requires gasoline to contain no less than 2.7% oxygen by weight;

2. An enhanced vehicle inspection and maintenance program meeting the Clean Air Act's criteria;

3. Forecasts of vehicle miles traveled (VMT) in the region, procedures for annual updates and reports attesting to the accuracy of the forecasts, and estimates of actual VMT based on traffic counts on area roadways;

4. Contingency measures that must be implemented if actual VMT exceeds forecasted VMT or if the area fails to attain the standard by the applicable date;

5. Transportation control measures necessary to demonstrate attainment of the standard (section 187(a)(2)(B)); and

6. A Clean Fuel Fleet program that requires all fleets with 10 or more vehicles to purchase a percentage of clean-fuel vehicles beginning with model year 1998, with the percentage increasing to 70% of all new vehicle purchases by model year 2000.

At the state level, Nevada adopted 486A which requires any state agency or local governing body with 10 or more motor vehicles in their fleet that operates in a county with a population of 100,000 or more to acquire or convert their vehicles to operate on an alternative fuel. The state of Nevada has also adopted a vehicle smog check program and a smoking vehicle program.

In 1991, the Clark County Board of Commissioners adopted the Clean Air Action Plan, which directed staff to coordinate with other government agencies to collectively implement strategies to combat air pollution. Part of the Clean Air Action Plan was the development and

implementation of the County's Alternative Fuel Strategy, which set policy direction for the conversion to natural gas vehicles.

In addition to the Clean Air Action Plan, the Clark County Board of Commissioners adopted the "Carbon Monoxide Air Quality Implementation Plan" in 1992 and amended versions in 1995 and 1999. The control strategies outlined in these documents function to mitigate ozone emission as well. Thus, the control strategies for carbon monoxide and ozone have focused on the following actions:

1. Enhancement of the vehicle inspection and maintenance program.
2. Required wintertime cleaner burning gasoline.
3. Improved vehicle emission management program.
4. Increased and enhanced mass transit system.
5. Adoption of a multi-level transportation demand management program including CATMATCH.
6. Roadway improvements.
7. Enhancement of traffic signalization system.
8. Identified and facilitated the improvement of stationary sources.
9. Implementation of a voluntary subsidized vehicle repair program through grant funding.

Specific Control Programs for Particulate Matter

The Valley has been making efforts to reduce PM_{10} emissions for some years. While there are numerous federal control measures focused on ozone and CO problems, PM control measures are more typically developed at the local level. The Las Vegas Valley is among five serious PM_{10} nonattainment areas all located in the western U.S. all of which are subject to unique circumstances. Control measures adopted to mitigate PM emissions in the Las Vegas Valley include the following:

- Required informational sign posting and permits for construction activities.
- Enforcement of covered load ordinances.
- Gravel pads at entrances and exits to construction sites to minimize mud track-out onto paved roads.
- Limiting off-road racing on federal lands.
- Required lowest achievable emission rates for industrial operations.
- Street cleaning program.
- Required new standards for vehicle emissions and fuel composition (i.e. prohibition of lead).
- County alternative fuels program.
- Light-weight paving program for unpaved roads.
- Paving for new sand and gravel access roads.

- Adopted opacity standards for diesel trucks.
- Restrictions on wood burning fireplace in new developments.
- Ordinance prohibiting illegal dumping.
- On-going working groups to address the problem of PM.

Proposed control measures undergoing public review in April and May, 2000 include ordinances to control dust from:

- Open areas/vacant lands;
- Unpaved roads and easements;
- Unpaved parking lots;
- Street sweeping;
- Unpaved shoulders;
- More stringent construction permits; and
- Enhanced civil penalties.

CURRENT AIR QUALITY IN THE LAS VEGAS VALLEY

The Clark County Health District (CCHD) conducts ambient air quality monitoring in Clark Co. in support of its air quality management program. A complete and accurate routine characterization of ambient air quality in Clark County is essential for achieving and maintaining air quality goals as well as for complying with Federal EPA monitoring requirements. Ambient monitoring data are used for several key activities:

- Attainment/nonattainment determinations
- Characterization of maximum pollutant concentrations
- Characterization of population exposure to pollutants
- Characterization of background concentrations
- Analysis of air quality trends
- Analysis of past and potential future effectiveness of emission control strategies
- Dissemination of information on the state of air quality to other agencies and the general public

Given the central role monitoring data play in any air quality management program, the success of the program depends critically on the completeness, quality, and timely reporting of the ambient data.

The goal of this portion of our review of the Clark County air quality programs was to assess the adequacy of CCHD's ambient air monitoring program in meeting Clark County's current and future air quality management needs. ENVIRON therefore has focused on the current status of and recent trends in key air quality indicators and addressed the issue of the adequacy of the ambient air quality monitoring program for fully and accurately characterizing air

quality in Clark County and for supporting current and future air quality management programs.

In recent years, a number of allegations have been made regarding the veracity of CCHD's air monitoring program. Various parties have voiced concerns about lack of adequate data quality control and even deliberate underreporting of peak concentrations. Investigating allegations of this sort would require a detailed audit of the monitoring program including unannounced on-site inspections of monitoring equipment and log books, inspections of chain-of-custody and calibration records, examination of strip charts or other backup data sources, verification that all quality assurance and quality control procedures are being followed, and a statistical analysis of historical reported values designed to identify any unexplainable non-random patterns. Conducting such a complete audit of the CCHD's monitoring program would require considerable resources beyond the scope of the present study. Furthermore, the U.S. EPA is wholly capable of such a review, and regularly assesses programs throughout the U.S. Such a review was done for Las Vegas in 1992. Our review therefore did not include a quality control/quality assurance audit of the CCHD's monitoring procedures and practices nor did ENVIRON attempt to review or estimate the precision and accuracy of monitoring data. Rather than conducting a partial audit in an attempt to examine a very limited number of allegations of past misconduct which may or may not be verifiable, ENVIRON chose instead to focus on the adequacy of CCHD's current monitoring program for supporting current and future air quality management concerns in the Las Vegas Valley. Conduct of a comprehensive monitoring program in which all records are fully open to public inspection should go a long way towards alleviating any future concerns regarding data quality.

Overview of Clark County's Ambient Monitoring Program

CCHD operates a network of approximately 20 air quality monitoring sites in Clark County, many of which measure multiple pollutants as shown in Figure 2-2. Monitoring is conducted according to EPA methods and requirements for the criteria pollutants (CO, PM_{10}, O3, NO2, SO2) as well as NO, $PM_{2.5}$ and haze or visual range (at two transmissometer locations). The CCHD also monitors for ammonia, chlorine, hydrogen sulfide, hydrogen chloride and operates an extensive pollen monitoring network. Meteorological data are collected at many of the monitoring sites. Clark County includes three regional airsheds (Las Vegas Valley, El Dorado Valley, and Ivanpah Valley). Sixteen of the 20 sites operated by CCHD represent air quality over the Las Vegas Valley which has a land area of approximately 1,300 km^2 with a current population of 1.3 million. By way of comparison, the Phoenix, AZ metropolitan area covers approximately 6,200 km^2 containing a total population of 2.8 million. Maricopa county operates a network of 25 air monitoring sites, most of which are located within the Phoenix metropolitan area. The South Coast Air Quality Management District (SCAQMD) in Southern California (Los Angeles) covers an area of 31,000 km^2 with a population of 15 million. The SCAQMD operates a network of approximately 35 monitoring sites within their service area which covers all of the South Coast Air Basin and portions of two other air basins. These comparisons suggest that the CCHD network is quite extensive for such a relatively small city when considered in relation to networks operated in other southwestern U.S. nonattainment areas.

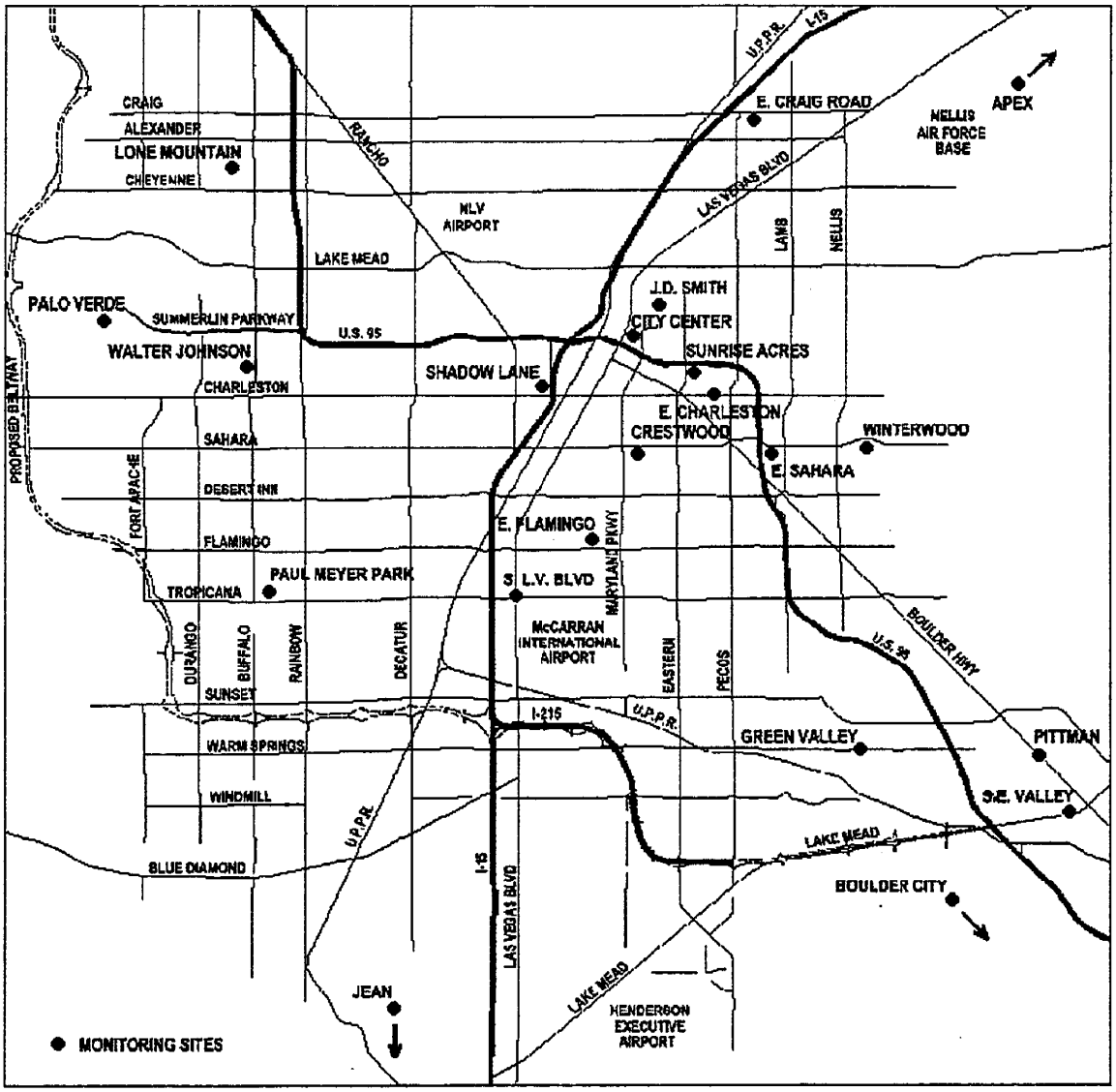


Figure 2-2. Las Vegas Valley monitoring network.

As noted in the previous section, Clark County is currently designated as being in nonattainment of EPA's National Ambient Air Quality Standards (NAAQS) for carbon monoxide (CO) and particulate matter less than 10 μm aerodynamic diameter (PM_{10}). As a result, the CCHD has devoted particular attention to monitoring of CO and PM_{10}. Other pollutants, however, have also been of interest to CCHD in recent years. EPA promulgated an 8-hour ozone (O3) NAAQS in July, 1997. While this standard is currently under legal review and its future status remains uncertain, 1998 and 1999 monitoring data indicate that the Valley could be designated as a nonattainment area with respect to compliance with the 8-hour O3 NAAQS.

EPA also promulgated a new standard for fine particulate matter ($PM_{2.5}$) in July, 1997. This standard is also under judicial review but major population centers such as Las Vegas are required to conduct $PM_{2.5}$ monitoring in anticipation that the standard will eventually be put

into force. CCHD began continuous $PM_{2.5}$ monitoring using beta attenuation monitors (BAMs) as far back as 1994 at some sites. Monitoring of $PM_{2.5}$ using the EPA required Federal Reference Method (FRM) monitors (which provide 24-hour average concentrations) has been conducted at five sites since 1/1/99

Maintenance of an adequate, high quality monitoring network for ozone, PM and their precursors will be essential to meeting the air quality management challenges associated with 8-hour ozone, $PM_{2.5}$, and urban and regional haze. Monitoring databases must be adequate for development of photochemical modeling databases, receptor modeling for PM and visibility, and estimating contributions of Clark County emissions to regional haze. The monitoring network must be continuously evaluated and expanded to keep up with the pace of growth in the Valley, changes in the emissions budget, and changing regulatory requirements.

Notably absent from CCHD's monitoring program is a VOC measurement program. VOCs contribute to ozone and $PM_{2.5}$ formation as well as urban and regional haze. Since Clark County is in attainment of the current ozone NAAQS, routine VOC monitoring is not required by EPA. In the future however, as the CCHD tries to deal with issues related to these pollutants, the need for a VOC monitoring program will become critical. Routine speciated[2] VOC monitoring of the type included in EPA's Photochemical Assessment Monitoring Station (PAMS) program is a fairly expensive undertaking. However, speciation analysis of VOC samples collected as part of an intensive field study can be very cost effective. This could be augmented by routine TNMHC (i.e., unspeciated) monitoring using instrumentation currently being evaluated in California. Comments received from CCHD indicate that VOC monitoring is being studied for implementation.

CCHD's air monitoring program was reviewed by EPA Region 9 in 1991 (EPA, 1992). It should be noted that at the time of the audit the CCHDs network consisted of just nine sites measuring CO, PM_{10}, NOx, and ozone. A number of concerns about the program were identified as a result of this audit. These included concerns about proper monitor station siting, location of the monitoring probe (air inlet), lack of a maximum concentration ozone monitoring site, lack of microscale sites for CO and PM_{10}, shortfalls in quality assurance and quality control procedures for PM_{10} filter handling and weighing, and lack of timely and complete precision and accuracy reporting to EPA. EPA Region 9 also expressed concerns regarding the amount of time spent by supervisory personnel on duties better handled at the staff level. CCHD instituted a number of changes to their monitoring program after this audit was completed. CCHD significantly expanded its monitoring network and worked with Region 9 personnel to resolve network design, probe placement, and data and QA/QC reporting issues. EPA Region 9 conducted a re-evaluation of Clark Counties air quality program in 1995 (EPA, 1996). The re-evaluation did not include a section on the CCHD ambient monitoring program "...due to the present efficiency of the program." (EPA, 1996; p. 40).

Data Reporting Procedures

CCHD produces an annual Network Review report in fulfillment of requirements of their CAAA Section 105 grant from EPA (CCHD, 1999a). This report reviews the status of the monitoring network noting any changes made to network configuration or operation, and

[2] Speciation refers to the quantification of ambient levels of specific VOC species, e.g. hexane, or benzene.

presents statistical summaries of data collected. A review of the most recent report (dated July 1999) reveals a growing monitoring network struggling to keep up with the rapid economic growth in southern Nevada. This report is still a work in progress and additional information is being added to it. While the report may fulfill EPA's minimum reporting requirements, it would be much more useful if it included additional discussion of the monitoring data summaries and more information on network operations. Of particular interest would be data completeness summaries, results of the quality control/quality assurance program, and more detailed information on sampling and analytic methods as well as data completeness criteria and other calculation procedures used to compute the data summaries. Certain data summaries presented in the report do not conform to EPA procedures. For example, the reported annual average PM concentrations are not seasonally weighted. Annual data summary reports should be expanded and modified as noted above and made available to the general public via CCHD's web site.

As required by the Clean Air Act, Clark County sends data collected at its monitoring sites to EPA's Region 9 office for input to the national Aerometric Information Retrieval System (AIRS). AIRS is the primary source of archived monitoring data from state and local agencies throughout the U.S.. However, there is often a delay of three months or more between the time data are collected and the time they become publicly available via AIRS. Thus, AIRS is not a suitable mechanism for rapid dissemination of recent data to the public.

In the past, data users have reported delays and difficulties in obtaining air monitoring data from the CCHD. Methods for direct dissemination of data to the public were also limited. Recently, CCHD added a new capability to their internet web site (http://www.cchd.org) which allows public access to real-time air monitoring data. This highly interactive site provides criteria pollutant concentration data as well as data summarized according to EPA's Air Quality Index (formerly the Pollutant Standards Index) and is an excellent tool for public data dissemination. Unfortunately, archived monitoring data (or data summaries) are not currently available on the site. Although historical data are available via EPA's AIRS database, there is often a considerable delay between data collection and its availability via the AIRS system. Additional data archive and public access systems should be developed either at the local or state level. An excellent example is the web based data archive operated by the California Air Resources Board (CARB – see http://www.arb.ca.gov/aqd/aqd.htm). CARB also makes available on a regular basis a complete data archive in various file formats on CD-ROM which is an excellent means of data dissemination to outside organizations.

The following subsections address air quality status and trends for each key pollutant species and present an assessment of the adequacy of the monitoring network for meeting current and future air quality management needs.

CARBON MONOXIDE

Carbon Monoxide Status and Trends

Las Vegas is currently classified as a serious nonattainment area for CO. CCHD collects continuous CO concentration data at 15 monitoring sites (Figure 2-3). Peak carbon monoxide concentrations have declined dramatically in Las Vegas between the late 1980s and the mid-

1990s but occasional exceedances were observed at the E. Charleston/Sunrise Acres site as late as 1998 (see Figure 2-4). No exceedances were observed in 1999. There is concern, however, that exceedances may still occur under meteorological conditions more favorable to high concentrations than occurred in 1999. No exceedances have been observed at any other CO monitoring sites in Clark County since 1994.

CO Monitoring Network

It is widely known that CO emissions in Clark County are dominated by on-road mobile sources as shown in Figure 2-5. The network is therefore largely designed to identify mobile source impacts. Routine (permanent) CO monitoring sites in the Las Vegas Valley are shown in Figure 2-6. Color contours in this figure show the spatial pattern of 8-hour average CO concentrations predicted by the UAM model for one of the high concentration episodes used in development of the 1999 CO AQIP. For this episode, the spatial pattern of predicted CO concentrations matches reasonably well with the spatial pattern of observed concentrations shown in Figure 2-7. Note, however, that the monitoring site data shown in Figure 2-7 represent the routine network augmented by a network of temporary sites set up for the CO field study conducted in support of the AQIP development. As can be seen by comparing Figures 2-6 and 2-7, the observed and predicted peak concentration is in an area just north of US 95 and east of Eastern Ave. where there are currently no routine monitors. This apparent CO hotspot is in a shallow topographic depression heavily impacted by mobile source emissions. Note that this event did not produce a particularly high concentration in the area of E. Charleston where most CO exceedances had been observed in the past. While it is possible that the location of the CO peak is more frequently south of US 95 where routine sites are located, it is also possible that unmonitored high CO may be occurring north of the Sunrise Acres (SA) monitor. Additional monitoring in this location is therefore recommended. It is our understanding that the CCHD, at the request of the City of Las Vegas, has established a pilot monitoring site at Freedom Park which is located off of Pecos between Owens and Bonanza, close to the suspected hotspot. On a larger scale, comparison of the spatial emissions map (Figure 2-5) with routine monitor locations suggests that the current network is otherwise adequately designed for detection of peak concentrations. CCHD has conducted temporary CO monitoring at a congested location along Las Vegas Boulevard (November, 1994 - May, 1995) and at the junction of I-15 and Spring Mountain Rd. (November 1998 - March 1999) to determine if other CO hotspots may be present. A micro scale monitoring site (MGM) was established at 3799 S. Las Vegas Blvd. in 1996 but violations of the standard have not been observed at this site.

Figures 2-8 and 2-9 show the population and employment changes in the Valley between 1995 and 2020. Highest population growth has been and will continue to be along an arc located on the fringes of the metropolitan area curving from the northern end of the Valley towards the west and around to the south. Additional high growth occurs around Henderson and Boulder City. Population growth in the largely built-out core urban and near suburban areas is relatively small with little infill growth projected. Much employment growth, however, has been and will continue to be in the tourism centers south of downtown Las Vegas, in and around McCarren airport and in the Summerlin development area along with construction and service industry growth in the high population growth centers. This diffuse regional growth pattern familiar to residents of California and other high growth western states leads to increased vehicular traffic along the current and planned major highway corridors. Thus,

although mobile source emission impacts in the high growth areas may be diffuse, additional travel through central areas already heavily impacted by these emissions will occur as a result of the population and employment growth patterns. Given this situation and the typical air drainage flow pattern associated with CO episodes, it is unlikely that there will be any dramatic shifts in the location of basin-wide peak CO concentrations. However, the current monitoring network may have to be augmented to track potential increases in emissions along any transit corridors that are expected to see significant future increases in traffic.

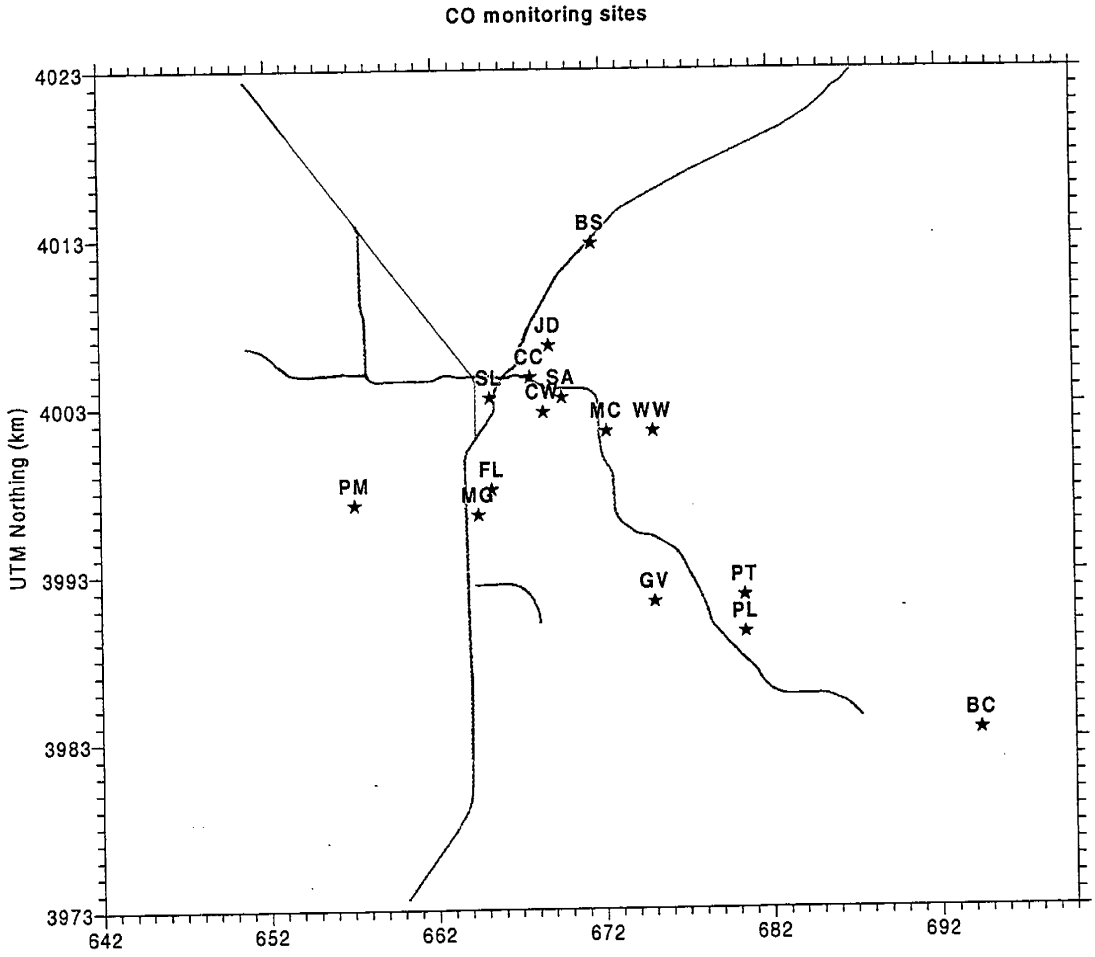


Figure 2-3. Las Vegas Valley carbon monoxide monitoring network.

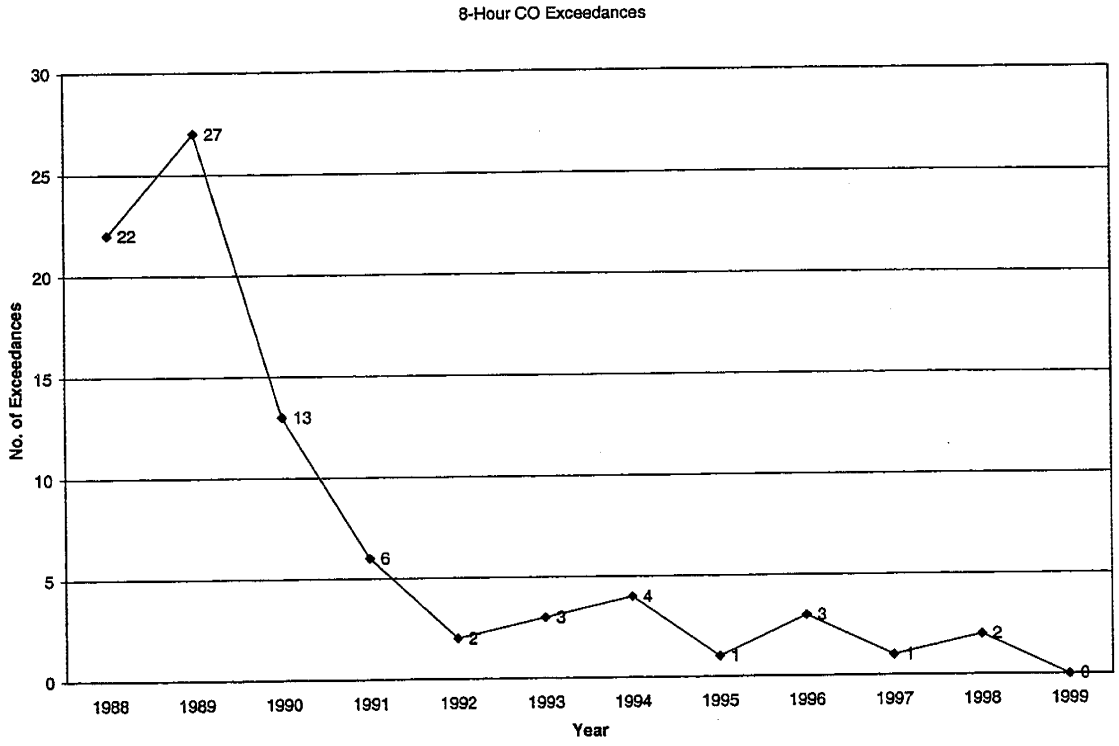


Figure 2-4. Number of non-overlapping exceedances of the 8-hour National Ambient Air Quality Standard for carbon monoxide.

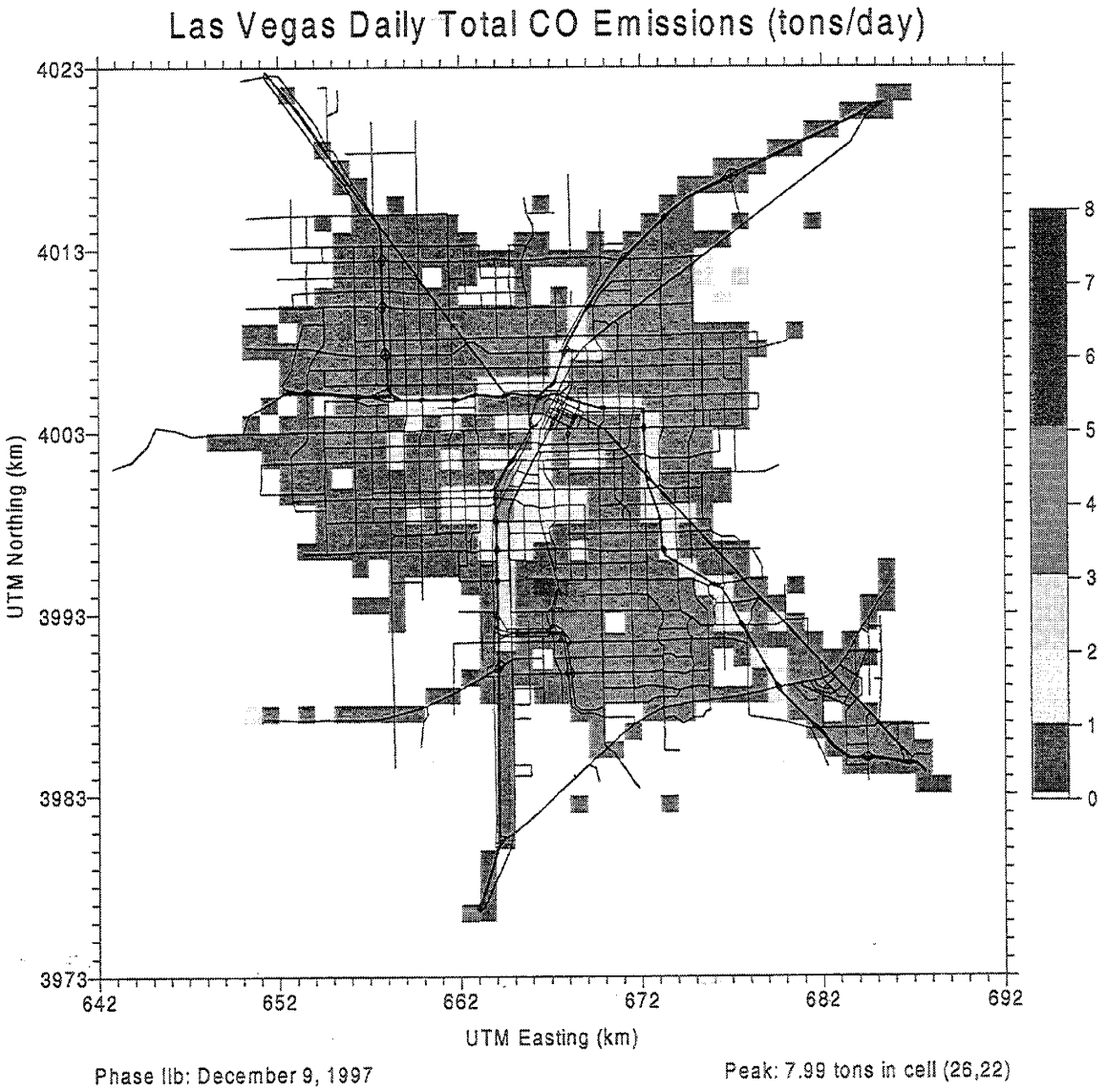


Figure 2-5. Total daily carbon monoxide emissions (tons/day) estimated for 12/9/97 (Source: Emery et al., 1999).

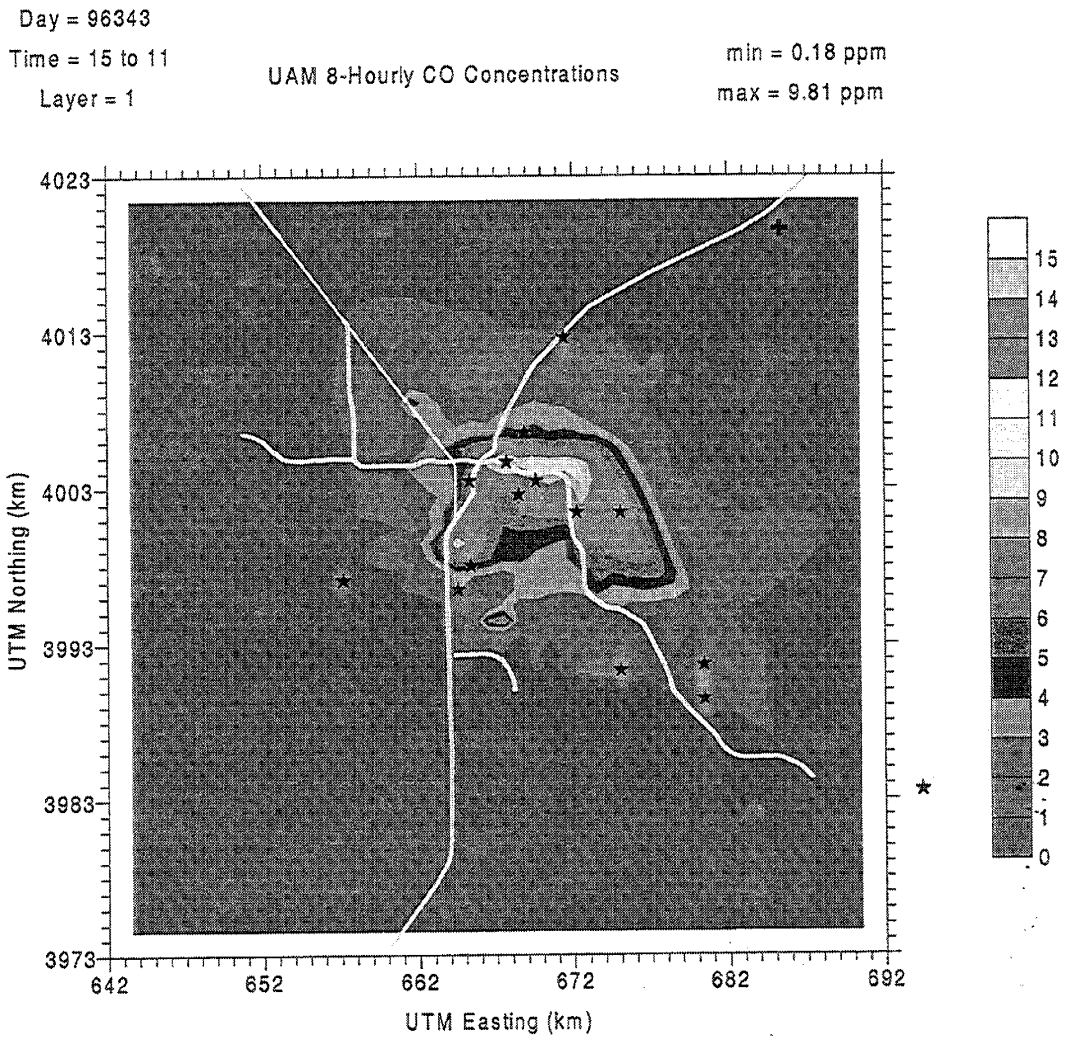


Figure 2-6. Predicted maximum 8-hour average carbon monoxide concentrations from the UAM model for the period 3:00 pm 12/8/96 to 11:00 am 12/9/96 (Source: Emery et al., 1998).

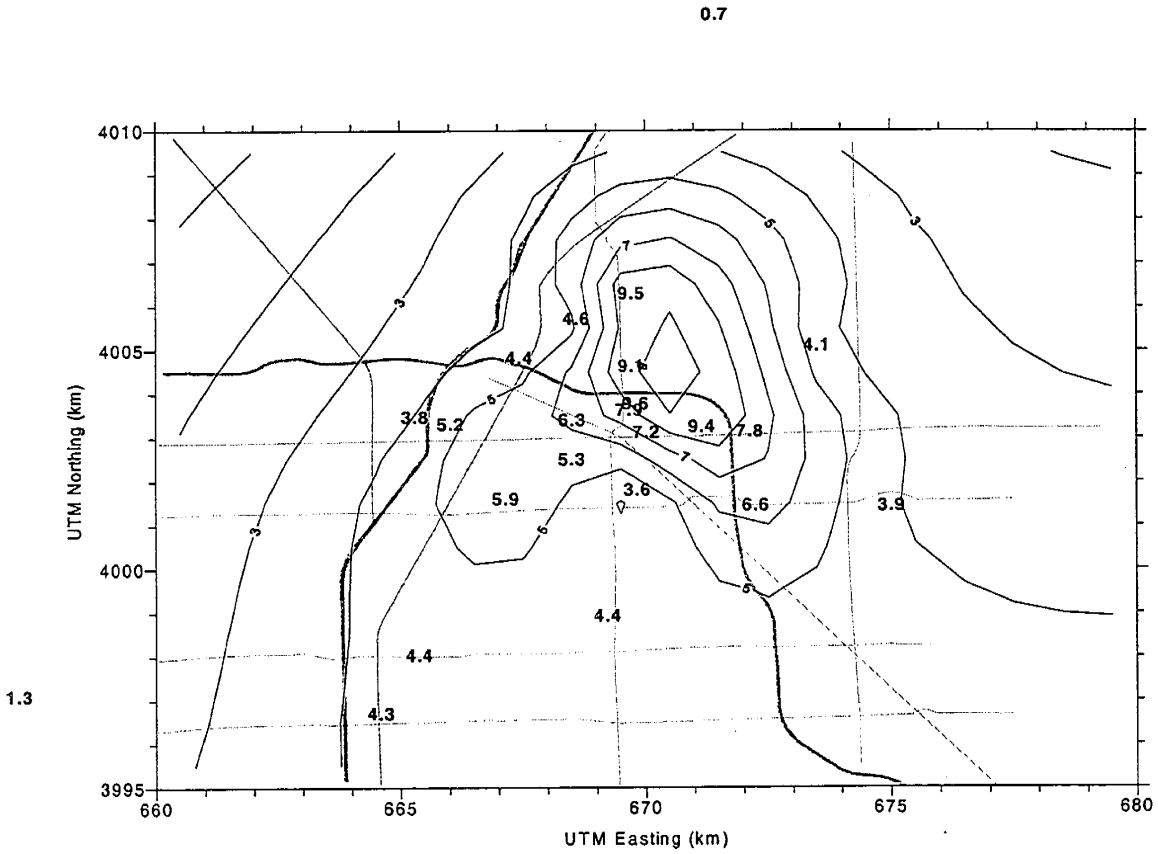


Figure 2-7. Spatial pattern of peak 8-hour average CO concentrations as observed during the December 8-9, 1996 episode (Source: Emery et al., 1998).

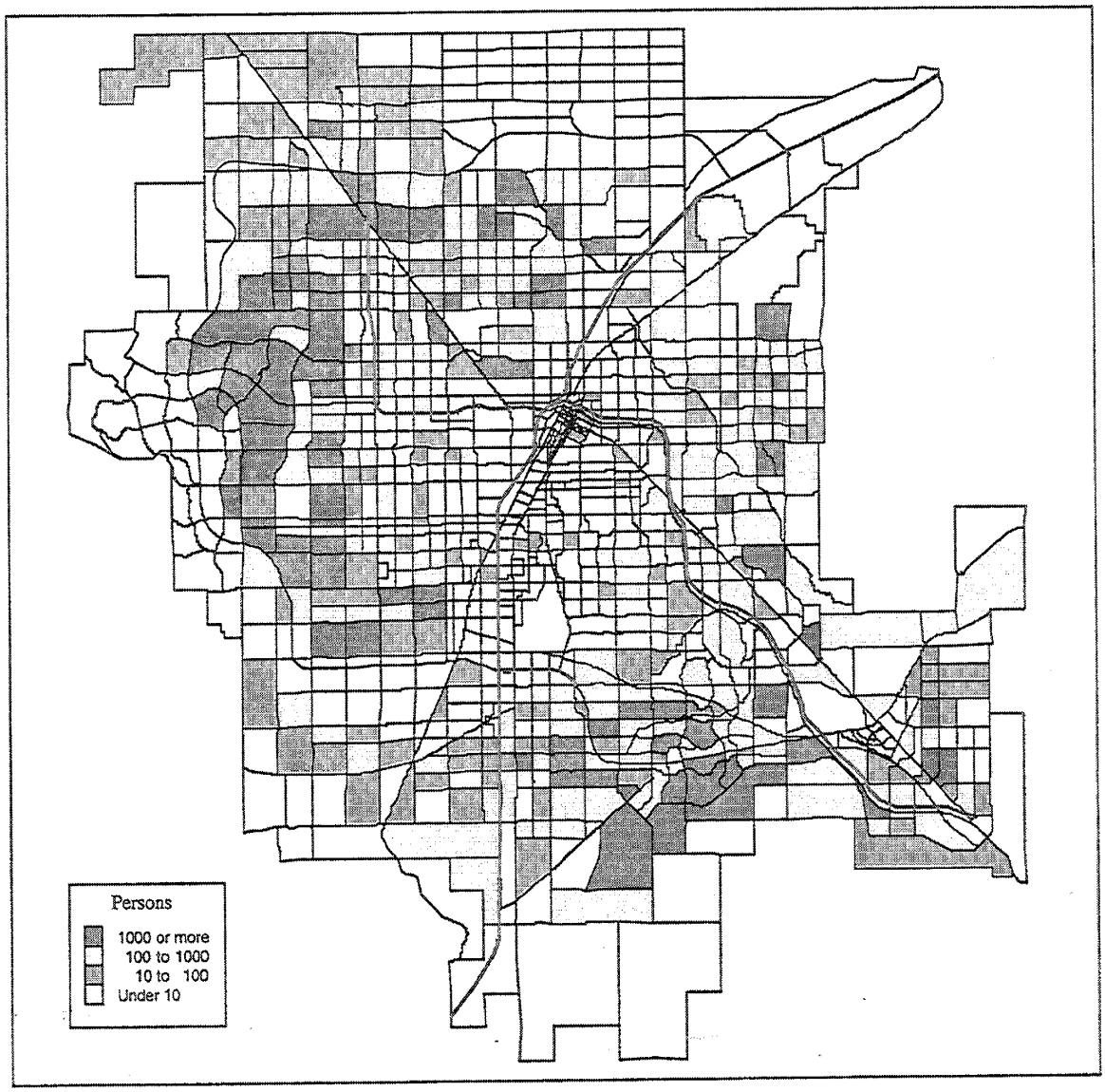


Figure 2-8a. Las Vegas population growth, 1995-2000 (Source: RTC, 1999).

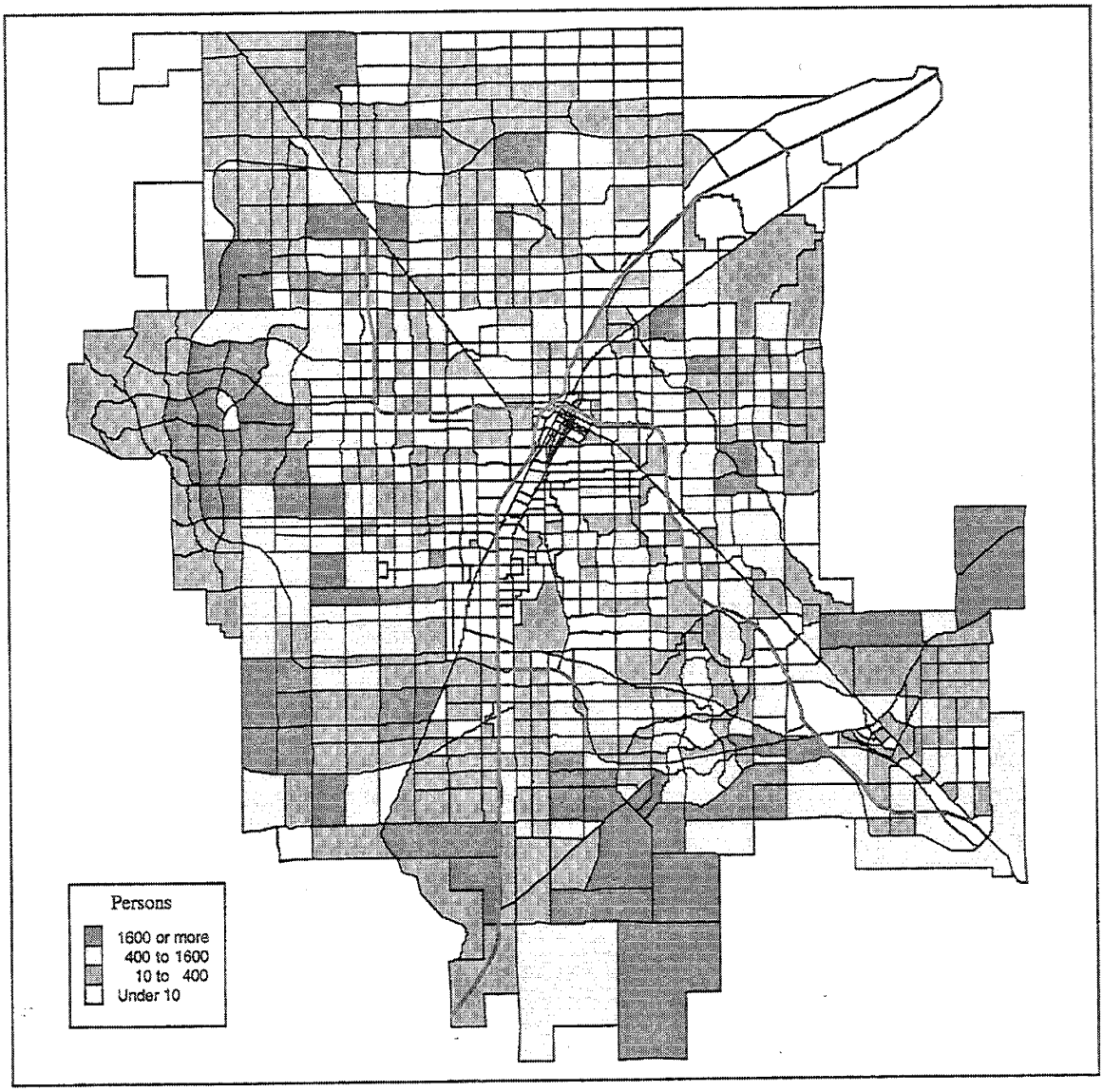


Figure 2-8b. Las Vegas population growth, 2000-2010 (Source: RTC, 1999).

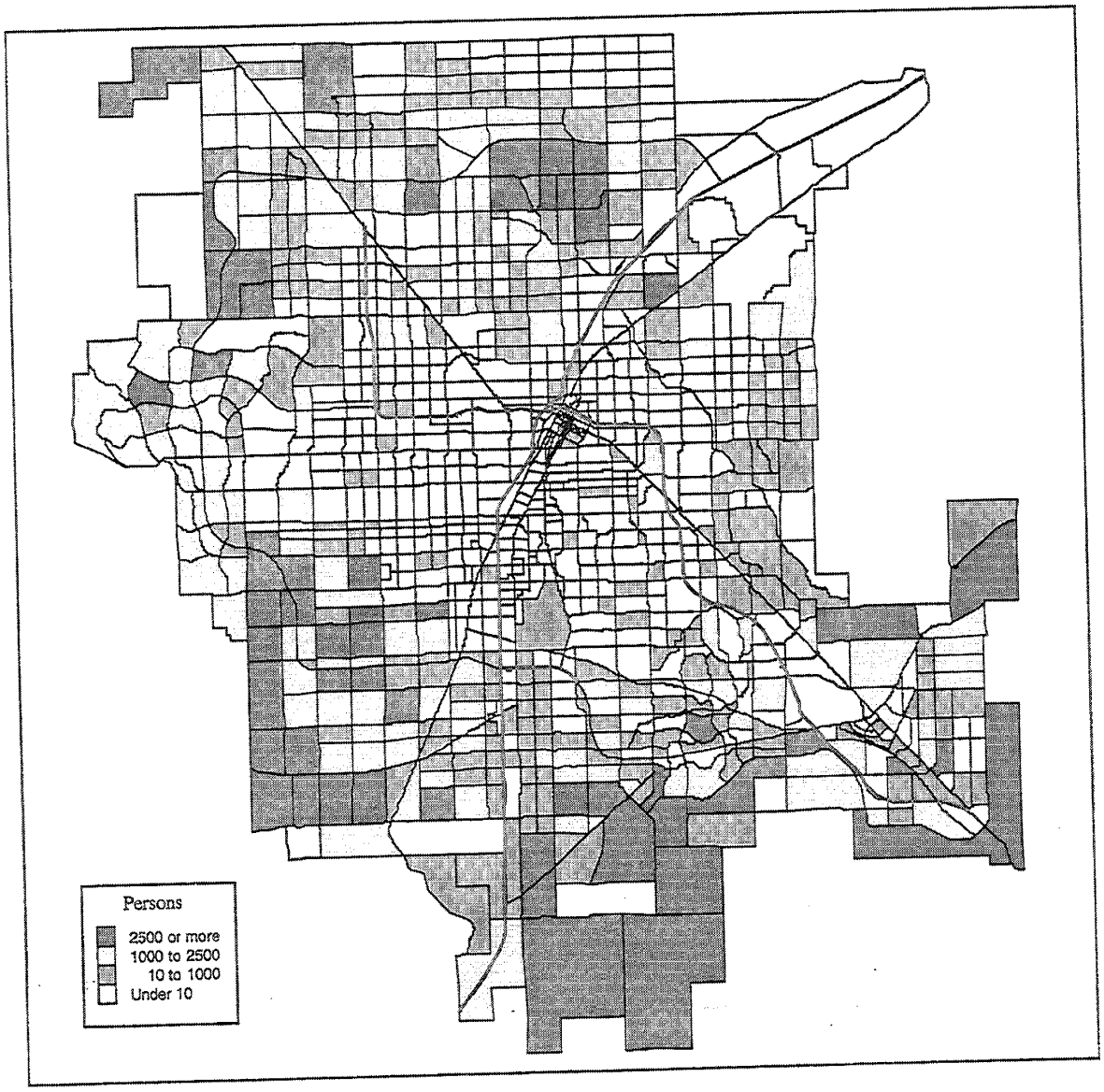


Figure 2-8c. Las Vegas population growth, 2010-2020 (Source: RTC, 1999).

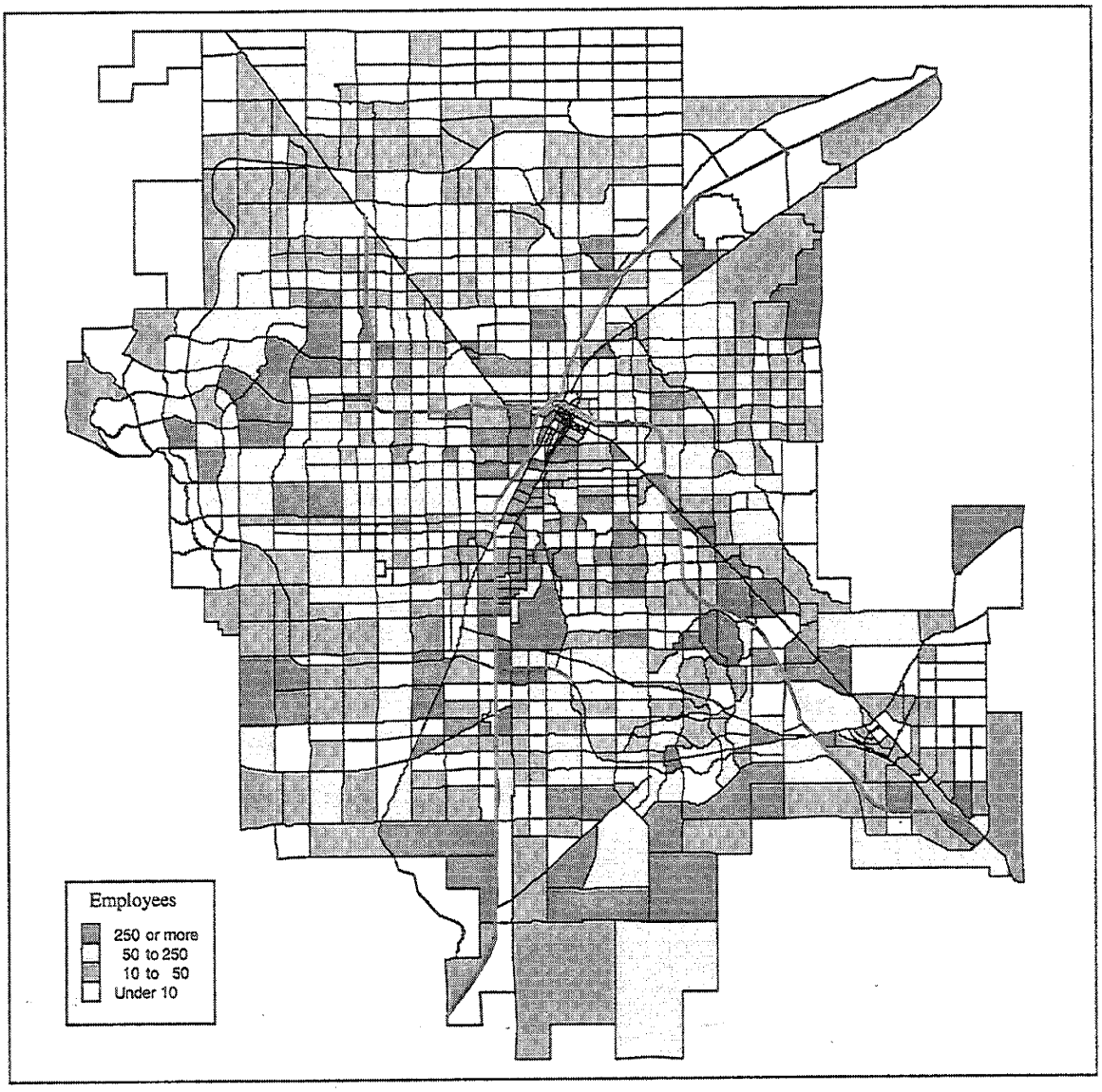


Figure 2-9a. Las Vegas employment growth, 1995-2000 (Source: RTC, 1999).

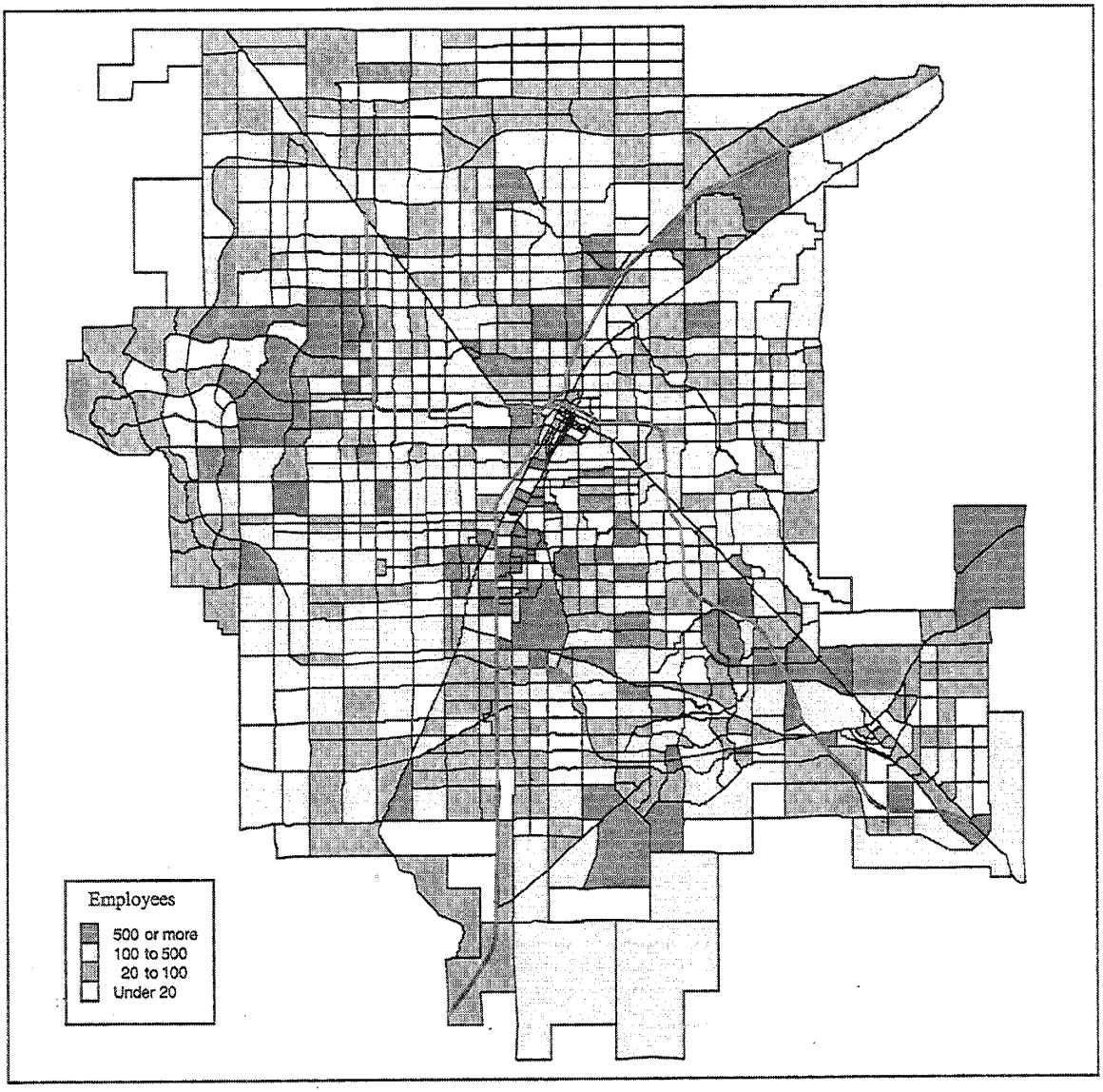


Figure 2-9b. Las Vegas employment growth, 2000-2010 (Source: RTC, 1999).

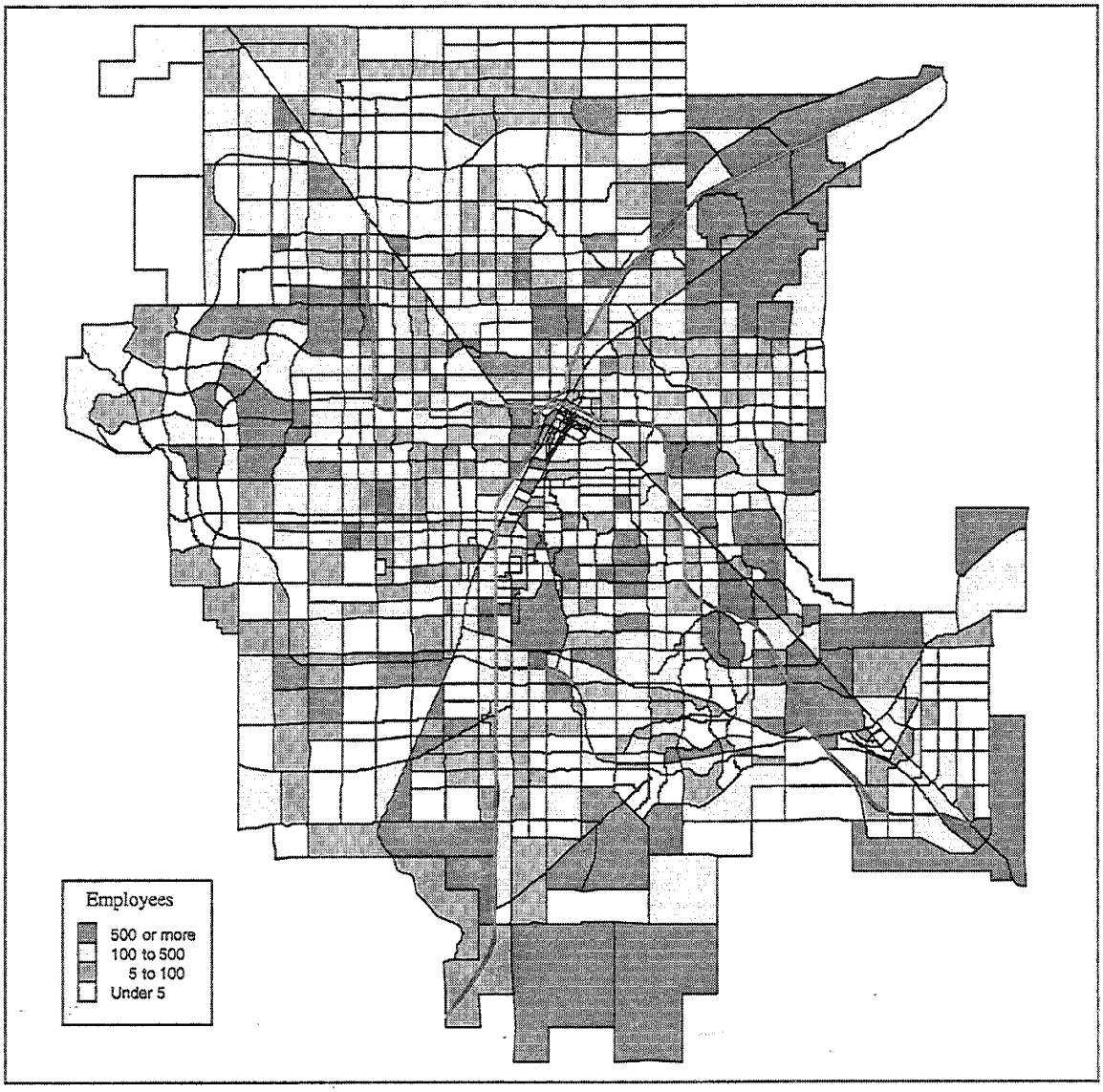


Figure 2-9c. Las Vegas employment growth, 2010-2020 (Source: RTC, 1999).

PARTICULATE MATTER

PM_{10} Status and Trends

The Las Vegas Valley is currently designated as a serious nonattainment area for PM_{10}. PM_{10} samples have been collected on a daily basis using BAMs since 1995 at six sites with nine additional sites reporting since 1997 and two more during portions of 1998 (see Figure 2-10). BAMs provide continuous measurements of PM mass which are reported as hourly, daily, and annual averages. Year-to-year fluctuations in PM_{10} levels are due to changes in emission generating activities (e.g., construction) as well as differences in the amount and timing of precipitation events and the frequency of high wind episodes. As a result, annual average PM_{10} concentrations and the number of exceedances of the 24-hour PM_{10} NAAQS have fluctuated in recent years as shown for sites with daily data in Figures 2-11 and 2-12, respectively, but no clear trend is evident. There is some indication that the production of PM_{10} during high wind episodes has declined since 1996 but this is confounded by interannual differences in precipitation (CCHD, 1999b). During 1998, exceedances of the 24-hour PM_{10} NAAQS of 150 μg/m3 were observed at Craig Road (3), Apex (1), Paul Meyer (1), and E. Flamingo (2) where the values in parentheses are the expected number of exceedances which are the actual exceedances adjusted to account for missing data using EPA's expected exceedances estimation methodology. CCHD reports that there were no exceedances of the 24-hour PM_{10} NAAQS during the first three months of 2000.

PM_{10} Monitoring Network

CCHD operates an extensive PM_{10} network which appears generally representative of conditions in the Valley. As noted by Chow and Watson (1997) and others, high PM_{10} mass loadings in Las Vegas are primarily associated with fugitive dust sources from construction, industrial, and excess road dust loading sources. As a result, peak daily loadings at PM_{10} monitors are strongly influenced by nearby sources, typically those within about 1 km of the monitoring site. However, construction and road dust sources are widespread throughout the Valley, including both monitored and unmonitored areas. As construction activity expands on the outskirts of the present urban area, additional monitoring sites may need to be established in these locations.

Concentrations at the PM_{10} background sites (Apex and Jean) are often not consistent on different days when PM_{10} exceedances are observed in Las Vegas. This suggests that these sites may be unduly influenced by local sources and not always representative of the regional average PM_{10} background. Consideration should therefore be given to locating a more representative background site.

$PM_{2.5}$ Monitoring

Monitoring of $PM_{2.5}$ mass using the Federal Reference Method (FRM) officially began at five sites in the Las Vegas Valley on 1 January 1999. As shown in Table 2-1 this includes one regional/background site (Apex), one regional/transport site (Jean), and three neighborhood scale sites (E. Charleston, JD Smith, and Green Valley). $PM_{2.5}$ BAMs have been operating at E. Sahara (since 1995), Green Valley and Craig (since 1996), Apex (since 1997), and JD Smith and Palo Verde (since 1998). BAM and FRM sites are shown in Figure 2-13.

Comparisons of the BAM data with the FRM data at Green Valley, Apex, and JD Smith will provide some indication of likely FRM-equivalent concentrations on the west side of the Valley based on BAM data from Palo Verde.

Table 2-1. $PM_{2.5}$ FRM monitoring sites.

Site	Scale	Site Type	Monitor Type[3]	Sampling Frequency
Apex	Regional	Background	FRM-SFS	1 in 6 Days
Green Valley	Neighborhood	Special Purpose	FRM EMAD	1 in 3 Days
JD Smith	Neighborhood	Core	FRM-SFS	Everyday
E. Charleston	Neighborhood	Core	FRM-SFS (two[4])	Everyday
Jean	Regional	Transport	FRM-SFS	1 in 3 Days

$PM_{2.5}$ concentration data from the beta gauge instruments are summarized in Table 2-2a. It should be noted that the validity of some of the BAM $PM_{2.5}$ data has been questioned (see CCDCP, 1998, p. 7). Concentrations are highest at sites in the urban center and to the northeast that typically also experience high PM_{10} levels. However, average $PM_{2.5}$ concentrations are only about 20% lower at Palo Verde on the west side of the Valley. It is possible that the Palo Verde site is heavily impacted by secondary particles formed in the atmosphere from gaseous precursors such as NOx and VOCs whereas the other high $PM_{2.5}$ sites are more heavily influenced by primary (directly emitted) particulate sources such as diesel exhaust and soil particles. However, chemical speciation of filter samples will be required to confirm this.

Table 2-2a. Summary of $PM_{2.5}$ BAM monitoring data.

Site	1998 No. Observations	1998 Mean[5] (µg/m3)	1998 Daily Max (µg/m3)	1999 No. of Observations (Jan – Jun)	1999 Mean[4] (µg/m3)	1999 Daily Max (µg/m3)
Craig Road	333 (Jan-Dec)	11	31	163	11	27
Green Valley	339 (Jan-Dec)	11	27	169	10	37
E. Sahara	338 (Jan-Dec)	12	30	170	12	26
Crestwood	342 (Jan-Dec)	11	41	168	13	49
McDaniel	237 (Jan-Sep)	8	26			
Jean	217 (Jan-Aug)	6	13			
Palo Verde	67 (Sep-Dec)	10	19	150	11	21
J. D. Smith	84 (Oct-Dec)	10	38	170	8	26

$PM_{2.5}$ FRM data for 1999 are summarized in Table 2-2b. Data from the Green Valley monitoring site were not available for most of 1999. As expected, concentrations at the outlying Apex and Jean site are low compared to the central Las Vegas sites where data were available (JD Smith and E. Charleston). Apex and Jean experienced maximum concentrations during the second quarter (April – June) while E. Charleston and JD Smith peak during the first quarter (January – March). These patterns suggest that wind-driven dust events and

[3] FRM = Federal Reference Method type monitor designated by EPA for PM2.5 mass measurements; SFS = Sequential Filter Sampler for automated collection of multiple samples.
[4] Co-located monitors for quality control.
[5] Arithmetic average of observed values.

possibly enhanced transport from central Las Vegas are major contributors on average to $PM_{2.5}$ at the outlying sites while wintertime stagnation events and possibly seasonal wood smoke emissions and enhanced ammonium nitrate formation combine to produce higher concentrations on average during the winter at the monitoring sites closer to downtown. There is a secondary peak at E. Charleston and JD Smith during the third quarter (July – September) which is probably related to enhanced photochemical formation of secondary particulates (and possibly enhanced transport of secondary particulates from California). E. Charleston had the highest annual average concentration (11.58 μg/m3) which is 23 % less than the annual average NAAQS (15 μg/m3). CCHD reports that no daily average $PM_{2.5}$ FRM or BAM concentration during 1999 or the first quarter of 2000 exceeded or came close to exceeding the 24-hour NAAQS (65 μg/m3).

Table 2-2b. 1999 quarterly (Q1=Jan-Mar, etc.) and annual mean $PM_{2.5}$ concentrations (μg/m3) from the Federal Reference Method (FRM) monitors.

	Apex (AP)	Green Valley (GV)	JD Smith (JD)	E. Charleston (EC)	Jean (JN)
1999 Q1	4.92	NA	11.32	12.58	4.32
1999 Q2	5.49	NA	8.14	8.17	5.60
1999 Q3	5.26	NA	8.67	9.03	5.19
1999 Q4	3.78	NA	13.00	16.53	3.77
1999 Avg.[6]	4.86	NA	10.28	11.58	4.72

Visibility Monitoring

Visibility and visible haze are the public's most common metric for assessing air quality. CCHD has been monitoring visibility in Las Vegas using a transmissometer with a 4 km path located in downtown Las Vegas since June, 1994. A second transmissometer began operation in Henderson in 1997. Average visual range determined from the downtown Las Vegas instrument for the period June 1994 to June 1996 is about 45 miles during the summer months and about 30 miles during the winter months (CCDCP, 1998). Averages for more recent years have not been published. Average visual range in the summer months is most likely greater than in the winter due to mixing of pollutants to greater heights during the summer.

Of course, visual range varies a great deal from one day to the next, and such averages do not capture the extremely low visibility days that many residents and visitors complain of or the good visibility days they enjoy. Between 1995 and 1998, the number of days with visibility less than 10 miles at 8:00 am ranged from 9 to 18. Over the same period, the frequency of visibility in excess of 50 miles at 8:00 am ranged from 36 to 68 days per year (CCHD, 1999b). Of course, different results would be obtained at different visibility cutpoints. It should also be noted that visual range is sensitive to relative humidity, with lower visibility generally prevalent on the more humid days, all else being equal.

While continuous monitoring of the light transmittance property of urban haze using the two transmissometers is a good first step in urban haze monitoring and analysis, these measurements by themselves are insufficient for understanding the nature and causes of haze

[6] Average of quarterly averages.

in Las Vegas. The most single most important measurement program needed to support analyses of haze are speciation analyses of $PM_{2.5}$ filter samples. CCHD currently plans to begin speciation monitoring later this year. Since haze components can be expected to exhibit spatial and temporal variability, steps should be taken to characterize these sources of variability. Given the cost of routine speciation monitoring, the most economical approach is likely to be collection and analysis of filter samples, optical data, and associated meteorological and air quality data from multiple locations (including background sites) as part of one or more intensive field studies. Since urban haze is strongly affected by meteorological conditions, steps should be taken to insure that hourly meteorological observations representative of both transmissometer locations are collected and archived with the visibility data for future analysis. Consideration should also be given to colocating a nephelometer (for measuring the portion of light extinction due to light scattering by particles) with one or both transmissometers.

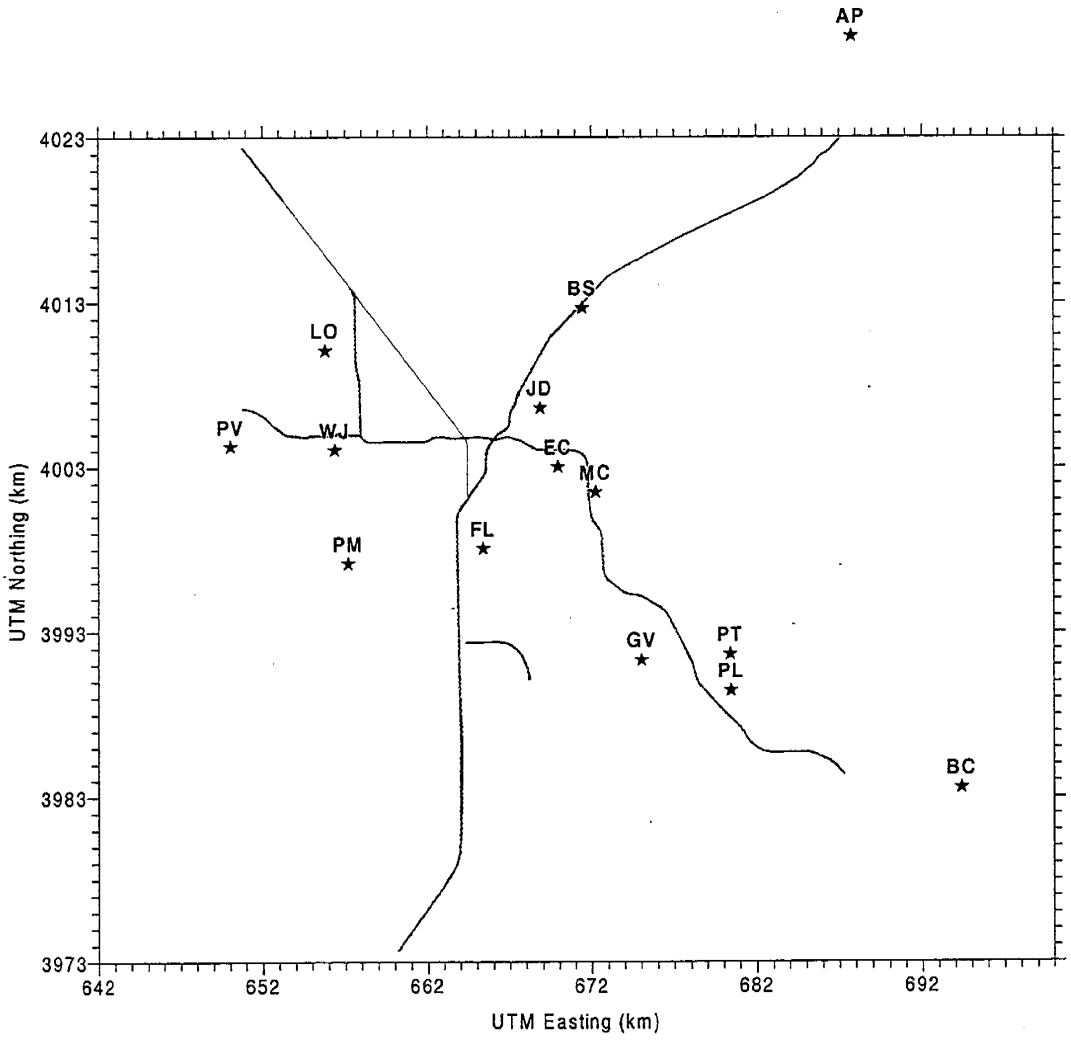


Figure 2-10. Las Vegas Valley PM_{10} monitoring sites.

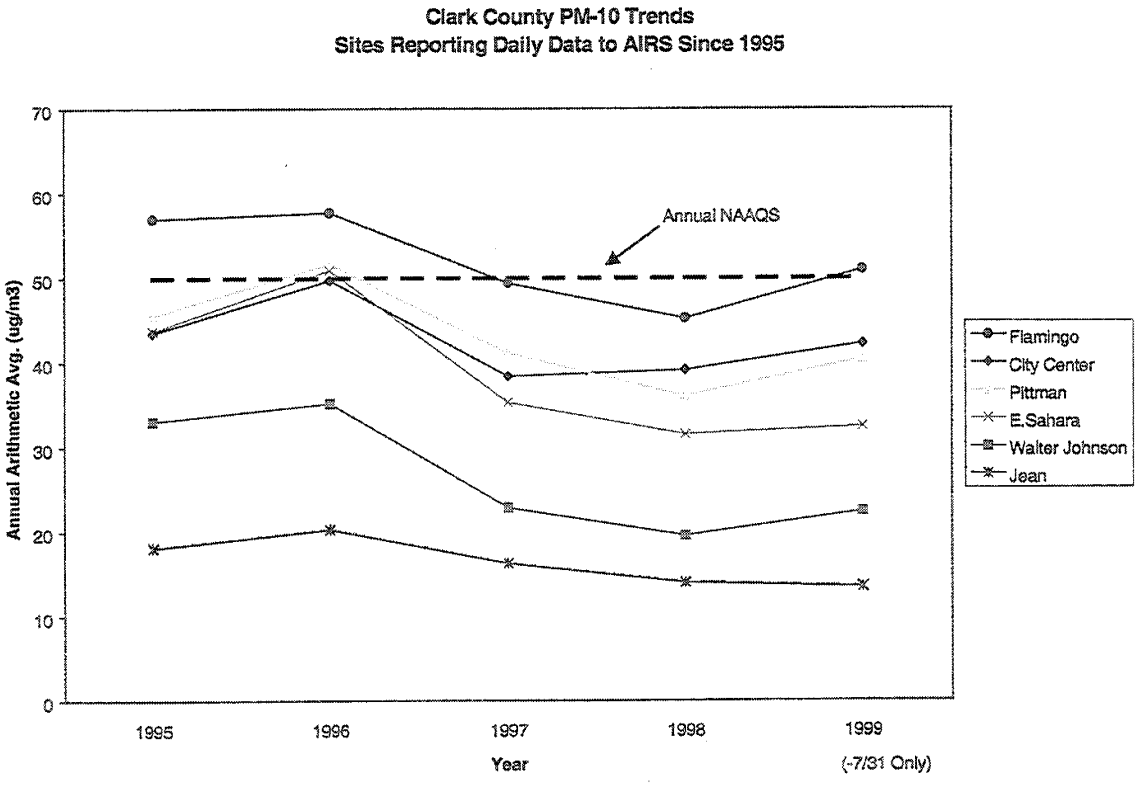


Figure 2-11. Annual average PM_{10} trends for monitors reporting to EPA's AIRS database since 1995.

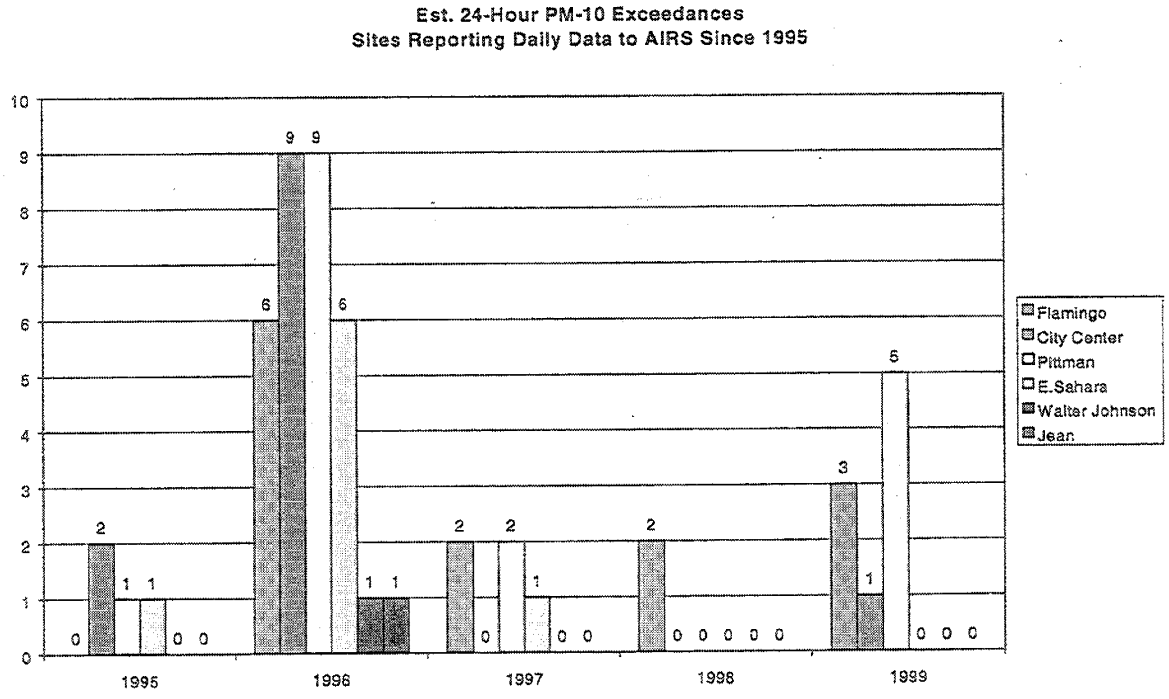


Figure 2-12. Estimated PM_{10} exceedance days for monitors reporting to EPA's AIRS database since 1995.

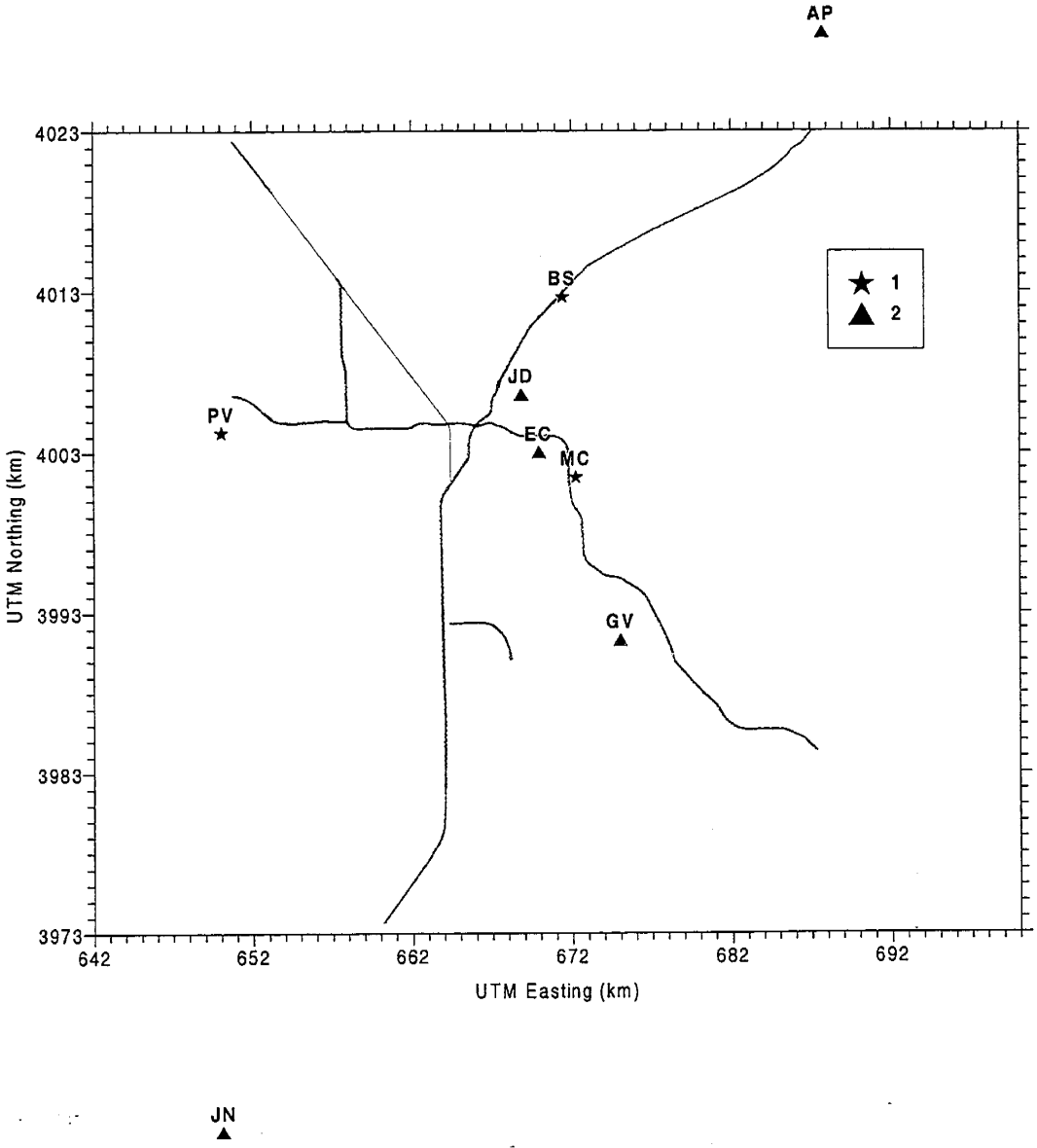


Figure 2-13. Las Vegas Valley $PM_{2.5}$ monitoring sites (1= BAM only; 2 = BAM and FRM).

OZONE

Ozone Status and Trends

Ozone trends in Clark County were recently summarized by the Nevada Bureau of Air Quality (Bureau of Air Quality, 1999). Violations of the 1-hour ozone standard only occur when four or more exceedances are observed over a three year period. No violations have occurred in Las Vegas going as far back as the 1988-1990 period. Exceedances of the 1-hour ozone standard last occurred in 1990 (one exceedance day at the City Center monitor) – none have been recorded since. Exceedances of the 8-hour ozone standard promulgated by EPA in 1997 have been noted at several locations in the Valley. Table 2-3 summarizes these exceedance days for the 1997 – 1999 period. Since an actual *violation* of the 8-hour standard requires that the 3-year average of the annual 4th highest daily maximum 8-hour concentration exceed 0.084 ppm, the values in Table 2-3 do not by themselves indicate that the Valley is currently in violation of the 8-hour standard. Nevertheless, the Valley is clearly in danger of violating the 8-hour standard. Trends in the annual highest and second highest daily maximum 1-hour ozone concentrations as reported by the Bureau of Air Quality at several long-term monitors are summarized in Figures 2-14 and 2-15. Year-to-year variations in these peak concentrations are primarily due to fluctuations in meteorological conditions. There is no indication in these data of any consistent, long-term trend in ozone levels during the 1990s. However, the frequency of high 8-hour ozone concentrations appears to have declined between 1985 and 1992 (CCDCP, 1998; Figure 3-3).

Table 2-3. Exceedances of the 8-hour ozone NAAQS (0.08 ppm): 1997 – 1999.

			No. 8-hour Exceedance Days		
Name	Abbrev	AIRS ID 32003xxxx	1997	1998	1999
Southeast Valley	PL	7	0	0	0
City Center	CC	16	0	0	0
Craig Road	BS	20	0	3	0
Shadow Lane (Health District)	SL	21	0	1	0
Apex	AP	22	1	2	2
Paul Meyer (Spring Valley)	PM	43	NA	5	0
Walter Johnson	WJ	71	NA	0	1
Lone Mountain	LO	72	2	6	0
Palo Verde	PV	73	NA	11	2
Winterwood	WW	538	0	0	0
Boulder City	BC	601	NA	0	0
Jean	JN	1019	NA	2	1

Ozone Monitoring Network

Predictions of high ozone episodes in the Las Vegas Valley using the UAM photochemical model (Emery et al., 1998) reveal a spatial pattern of ozone in which peak concentrations occur on the western side of the Valley (see Figure 2-16) as air being warmed by contact with the earth's surface travels up slope towards the Spring Mountains during the course of the day.

With the establishment of the Palo Verde ozone monitor in 1998, ozone concentrations in populated areas around Summerlin are now being monitored (see Figure 2-17). The model predictions have been borne out as the Palo Verde monitor had nearly twice as many 8-hour standard exceedance days in 1998 as any other site. It is of course possible that even higher values may be found at other locations on the west side of the Valley but better meteorological and photochemical modeling databases will be needed to identify other potential high ozone sites. Significant growth along the current urban boundary and changes in the ratio of VOC to NOx emissions (and the composition of the VOC emissions) also have the potential for altering the location of the typical ozone maximum in future years. These trends will need to be monitored to evaluate the need for additional ozone monitoring sites. New ozone monitoring sites are currently being contemplated for the north-northwest and north-northeast portions of the Valley (CCHD, 1999a).

Monitoring of Meteorological Parameters

CCHD collects meteorological data (wind speed, wind direction, temperature at 2 m and 9 m, and relative humidity) on 10 m tall towers located at most (but not all) of its air quality monitoring sites. Wind speed and direction data were available from 13 monitoring sites during a study of conditions associated with ozone exceedances during 1998. Similar surface meteorological data are also available from the National Weather Service at McCarran airport and at Nellis Air Force base.

While the surface meteorological network may be adequate for many purposes, managing complex air quality issues such as those related to ozone and secondary $PM_{2.5}$ will require data on the three-dimensional structure of the atmosphere for which the current surface network is inadequate. There is currently no source of routine data on the condition of the atmosphere above 9 m over the Las Vegas Valley. The nearest NWS upper-air sounding station is in Desert Rock, NV which is a considerable distance northwest of Las Vegas. Upper air conditions at this remote location are not representative of conditions over the Las Vegas Valley. Alternative platforms for collecting upper-air data over the Valley (doppler acoustic sounders, radar wind profilers, radio acoustic sounding systems, rawinsondes, etc.) should be explored and one or more adopted for taking routine observations. These can be supplemented by other 3-d data collection techniques (additional remote sensors, aircraft, etc.) during intensive study periods.

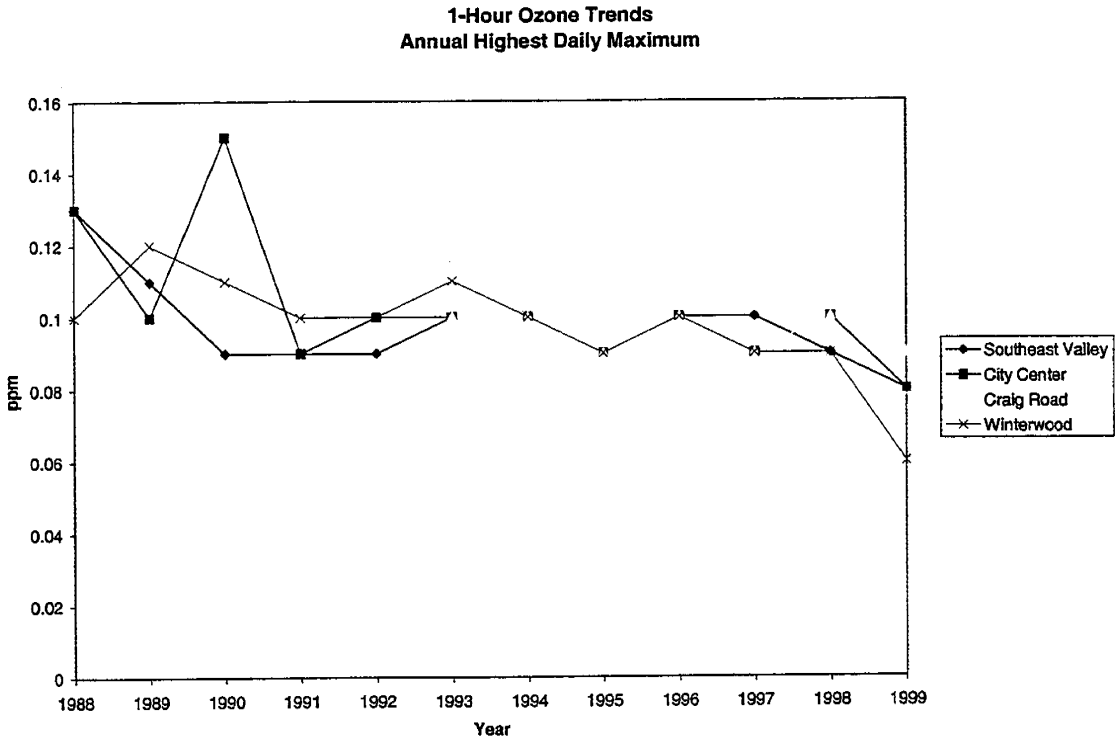


Figure 2-14. Trends in annual highest daily maximum 1-hour average ozone concentrations.

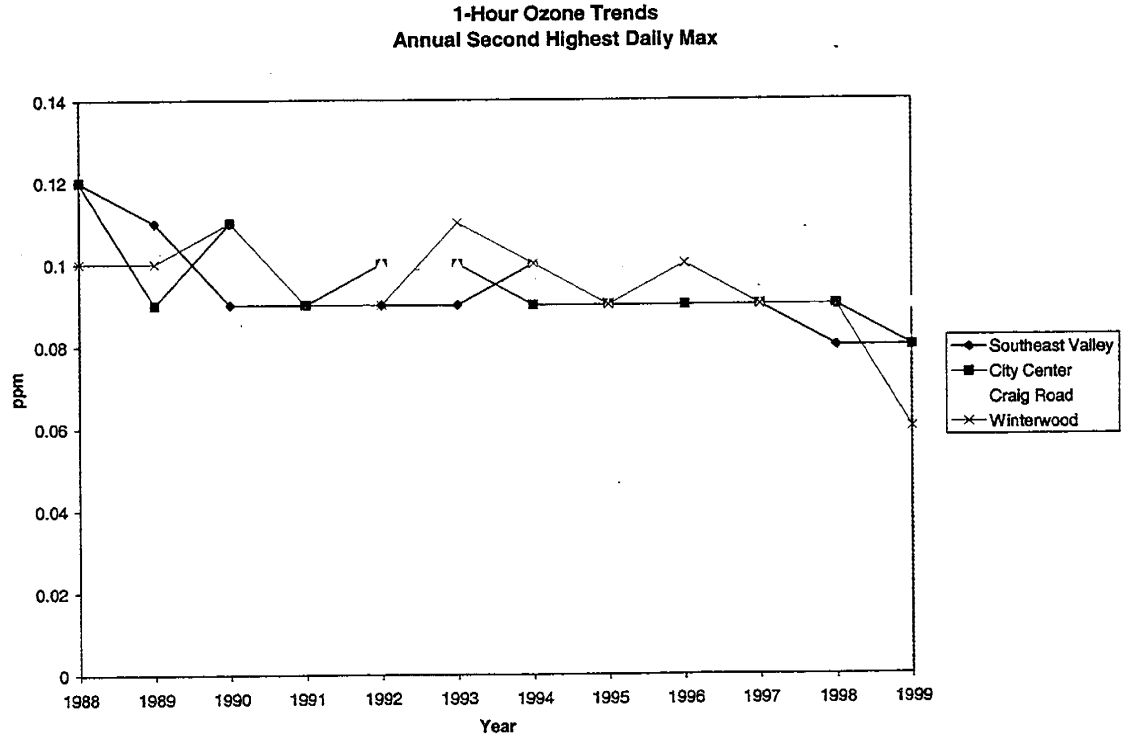


Figure 2-15. Trends in annual second highest daily maximum 1-hour average ozone concentrations.

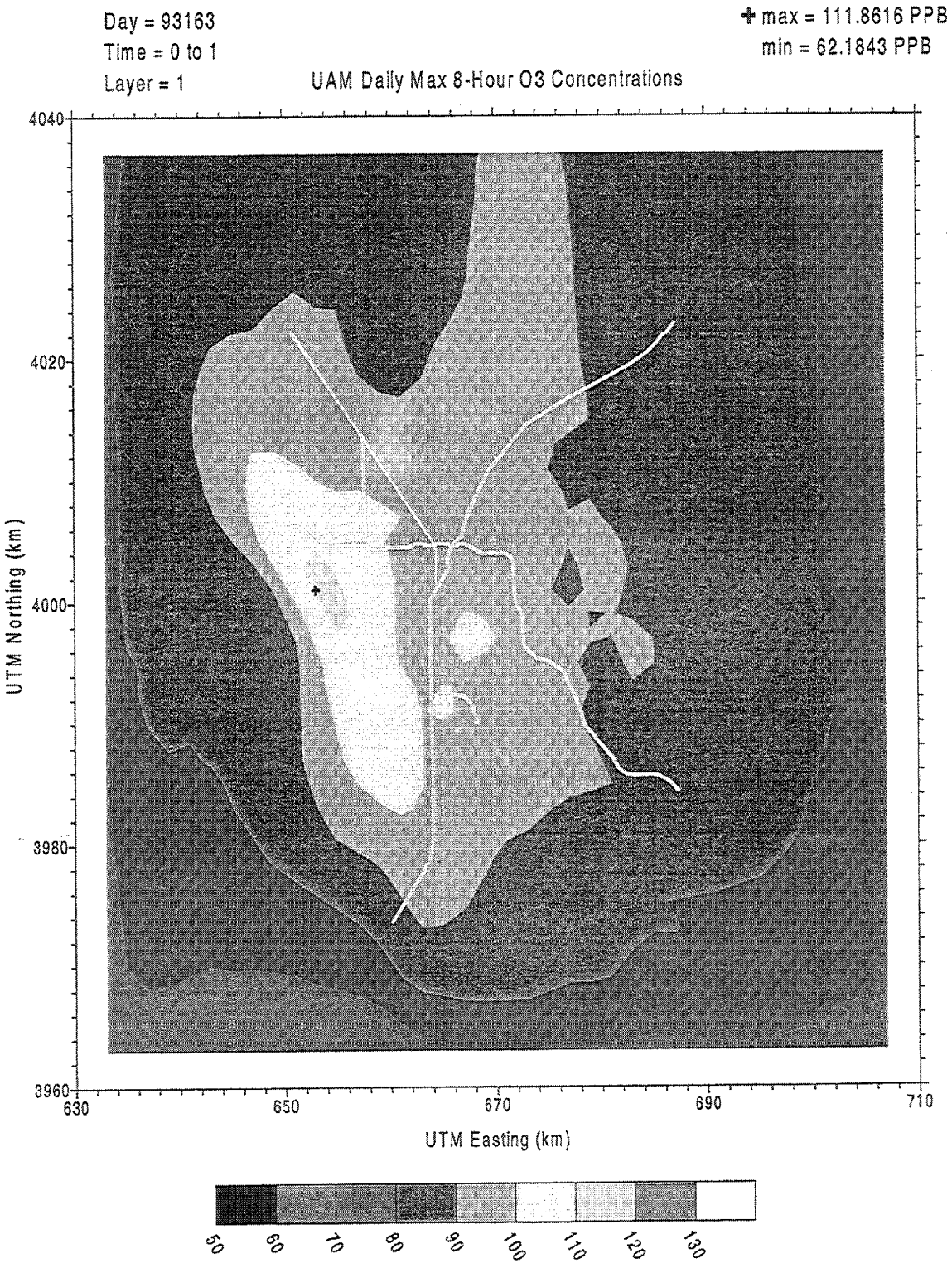


Figure 2-16. UAM daily maximum 8-hour ozone concentration distribution in the 1997 Las Vegas Fuel case (ENVIRON, 1998).

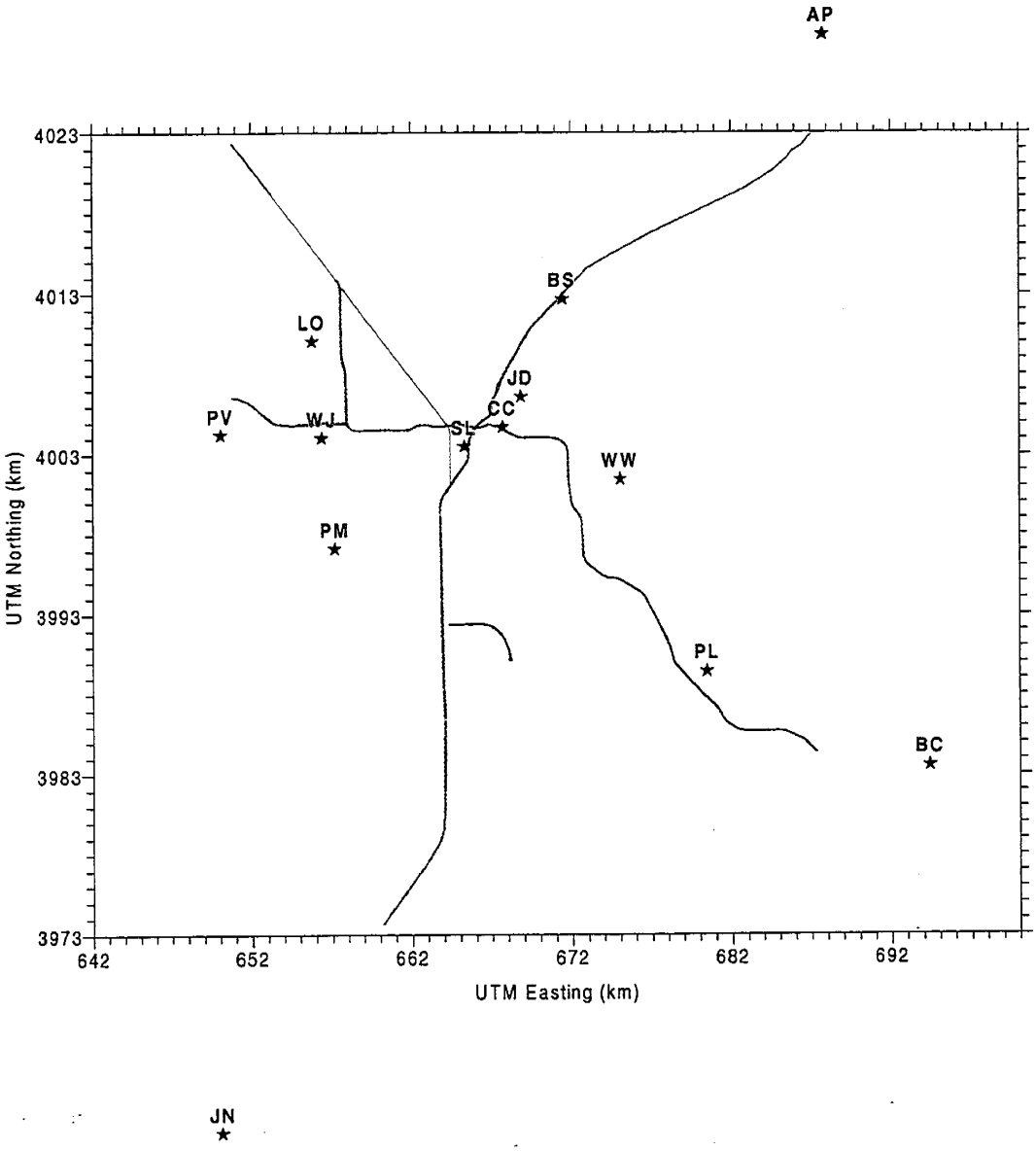


Figure 2-17. Las Vegas Valley ozone monitoring sites.

Summary

In recent years the CCHD has significantly expanded its air monitoring activities. The expanded and improved monitoring program is capable of fulfilling most of the support functions required by Clark County's air quality management program. Continued added funding support for equipment, personnel and training will be needed to fully realize the potential benefits of the expanded network. Furthermore, as Clark County continues its rapid economic growth, the CCHD will need to periodically re-evaluate the adequacy of its monitoring network and make any necessary adjustments to network design and operations.

As noted above, there remain several key areas in which the monitoring program should be expanded to better serve the citizens of southern Nevada. These include:

- Development of a program for monitoring volatile organic compounds (VOCs). Understanding of the composition and distribution of VOCs is critical to development of control programs for ozone, $PM_{2.5}$, and urban and regional haze. No data on VOCs are currently being collected in Las Vegas. At least a minimal routine monitoring network supplemented by more detailed measurements during intensive study periods is recommended.

- Additional CO hotspot monitoring. A field study and modeling analysis conducted for a December, 1996 episode indicated the existence of a CO hotspot just north of US 95 where routine CO monitoring is not currently being conducted. Consideration should be given to additional CO monitoring in this location.

- Establishment of more representative PM background sites. A review of PM_{10} data collected at the Apex and Jean monitoring sites on days with PM_{10} exceedances in Las Vegas suggests that these sites may be intermittently influenced by one or more local sources to a greater extent than desirable for a background site. One or more alternative locations free from the influence of local sources should be considered. This may be less of a problem for $PM_{2.5}$ measurements which are less influenced by local fugitive dust sources.

- Additional upwind monitoring of ozone, $PM_{2.5}$, and meteorological parameters. An analysis of ozone episodes during 1998 (Environ, 1999) indicated the possibility of significant influence of sources in Southern California on ozone levels in Las Vegas under certain conditions. This analysis was hampered, however, by a lack of air quality and meteorological data upwind of Las Vegas (only data from the Jean site were available). Consideration should therefore be given to expanded upwind monitoring southwest of the Valley. Since transport episodes may be relatively rare, it may be necessary to establish one or more semi-permanent sites to capture a sufficient number of events. This could be augmented by a series of intensive sampling periods when conditions favorable to transport are forecast to occur. It should be noted that California is currently considering an expansion of its ozone monitoring network in the Mojave desert.

- Establishment of an upper air meteorological monitoring capability. Monitoring of meteorological conditions aloft is crucial to the development of air quality modeling databases. Upper air data representative of the Las Vegas Valley are currently not

available. Routine monitoring of wind, temperature, and relative humidity profiles is recommended.

- Improved and expanded data reporting and dissemination. Additional improvements to CCHD's data reporting and dissemination procedures are recommended. Archived data should be made available via the Air Quality Division's internet web page. These archived data should consist of preliminary (unvalidated) data saved from the current real-time data displays. As validated data become available, the validated files can replace the older pre-validation files. Detailed quarterly and annual data summary reports should also be prepared for wide public distribution.

ENVIRON realizes that fully implementing all of the above recommendations would be an expensive undertaking and that sufficient resources may not be currently available. Our purpose in making these recommendations is to identify the most important ways in which the monitoring program could be improved in the coming years to better serve the citizens of Clark County. Appropriate consideration should be given to these recommendations in the budget setting process.

FUTURE POPULATION AND VEHICLE TRAVEL PROJECTIONS FOR THE LAS VEGAS VALLEY

The Las Vegas Valley is one of the fastest growing urban areas in the United States. Population and traffic projections can provide valuable insights regarding future air quality conditions. Population, employment, and traffic projections also form the basis for projections of emissions from sources such as aircraft, construction, vehicles, industrial production, or off-road recreational vehicles[7]. This section addresses projected growth in both population and on-road vehicle travel in the Las Vegas Valley using the available data which covers the period from 2000 to 2020. As emission forecasting was conducted through 2025, population and VMT trends were extrapolated to that year using the available data.

POPULATION AND VEHICLE MILES TRAVELED (VMT) GROWTH FACTORS

Population and VMT growth in Clark County are estimated with state-of-the-art models of economic and travel factors. While improvements are always possible, and in progress, Clark County appears to be using and improving upon the best tools and survey techniques available. Currently a wide variety of agencies responsible for regional planning for air, water and transportation services agree on the methodology and results of a specific population forecast approach.

[7] This is not intended to be a comprehensive list but simply some examples of the range of sources whose emissions are projected using socioeconomic and travel projections.

Population Estimates

In the Las Vegas area as recently as late 1999, population projections have been highly controversial and have differed widely depending on the source and methodology used to develop them. Recently, the state demographer, the Southern Nevada Water Authority, the Clark County Department of Comprehensive Planning, and the Regional Transportation Commission all reached agreement to use a common forecast of long term economic and population conditions in Clark County. The Center for Business and Economic Research (CBER) of the University of Nevada Las Vegas (UNLV) are jointly working with the above-named agencies to use the "REMI" (Regional Economic Model) as a starting point from which to estimate future population and economic conditions in the Las Vegas Valley. The model is calibrated by CBER to reflect the most current information regarding hotel/casino construction, employment, and infrastructure investment in Clark County. The model's 1999 population estimate is adjusted using local population data obtained from an annual household survey done by postal carriers and commissioned by Clark County.

The REMI model is an econometric model which endeavors to account for the complex relationships between demographic and economic variables over time. The model starts with U.S. census data, which is supplemented by local data. In rapidly growing areas such as Las Vegas, population is commonly measured by growth in housing units. CBER collected detailed data on expected growth in housing units and hotel units in order to augment existing census data. Employment projections are made for 54 different Standard Industrial Classification categories. The largest sectors for the Las Vegas area include (in order by percent of employment) hotels (22%); Rest of Retail (10.41 %); Construction (8.83%); Miscellaneous business services (6.7%); state and local (7.54%); Eating and Drinking (5.44%); and Medical (4.71%).

One of the most significant challenges in calibrating the model to Las Vegas conditions is accurately accounting for new hotel construction and resulting employment. New hotels create additional jobs which increase the rate of migration into the area. Based on surveys performed in support of the Las Vegas REMI model, it was found that there are approximately 1.6 hotel jobs for each hotel room. CBER surveyed new hotel applications and developers and estimated that 85 percent of planned new rooms represent additional stock in hotel rooms (with the remaining 15 percent representing replacement or demolition of older hotels and rooms). The center attempts to stay as up-to-date as possible with current plans. For example the December, 1999 report considers such developments as Aladdin, Suncoast, Grand Bay, three new Circus Circus projects, Venetian Lido, Lake Las Vegas, and Summerlin South and West.

The CBER center also has begun including an "amenity factor" in the model to account for the social costs imposed on Clark County residents by rapid growth. Because rapid growth is often associated with congestion, higher crime rates, air quality problems, and shortages in public services such as education, these costs make rapidly growing areas less attractive relative to other areas. The CBER center has incorporated an assumption that these types of social costs increase by 0.3 percent per year beginning in the year 2000. Population growth is slowed marginally by the addition of this cost, which ranges from 0.03 percent of real wages in 2001 to almost one percent of real wages by 2025.

The most recent estimate (December, 1999) of population is displayed in Figure 2-18.

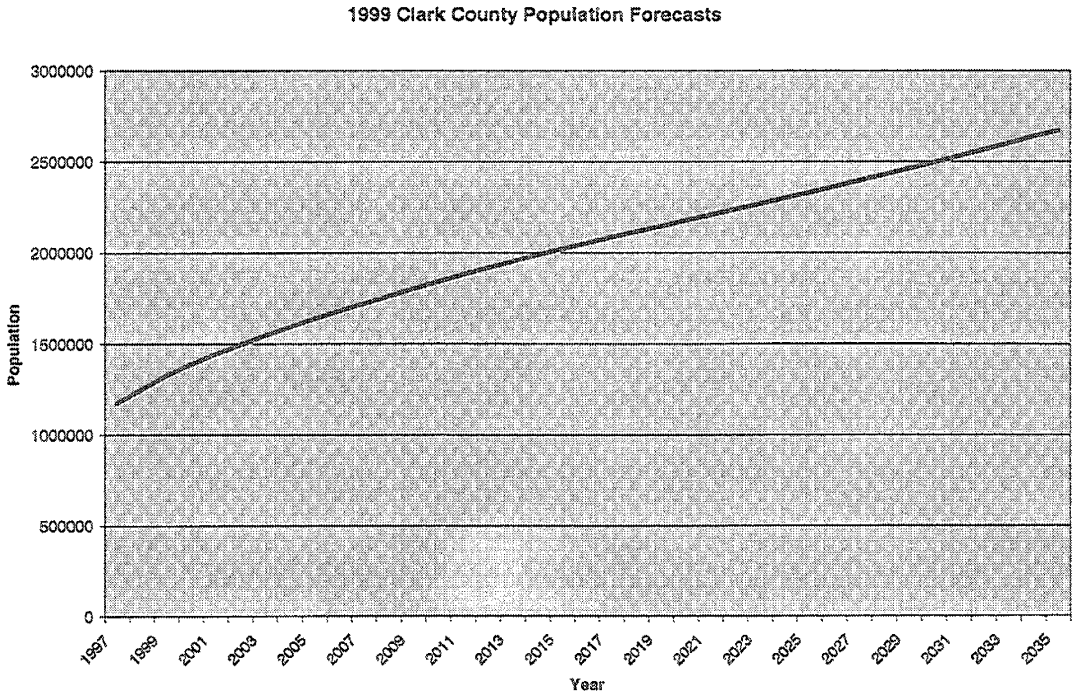


Figure 2-18. 1999 Clark County population forecasts.

This forecast was made in late December, 1999 by the CBER center and is being utilized by the above-named agencies for planning purposes. The following specific population forecasts are listed:

Population and growth rates in Clark County: 1997 – 2035.

Year	Population	Growth Rate
1997	1,170,113.00	
1998	1,246,193.00	6.5
1999	1,321,319.00	6
2000	1,383,335.00	4.7
2001	1,439,676.00	4.1
2002	1,492,042.00	3.6
2003	1,541,672.00	3.3
2004	1,588,948.00	3.1
2005	1,633,915.00	2.8
2006	1,676,664.00	2.6
2007	1,717,754.00	2.5
2008	1,758,073.00	2.3
2009	1,797,813.00	2.3
2010	1,836,859.00	2.2
2011	1,875,303.00	2.1
2012	1,912,657.00	2
2013	1,948,520.00	1.9
2014	1,983,110.00	1.8
2015	2,016,609.00	1.7

Year	Population	Growth Rate
2016	2,049,222.00	1.6
2017	2,081,161.00	1.6
2018	2,112,495.00	1.5
2019	2,143,363.00	1.5
2020	2,173,843.00	1.4
2021	2,204,335.00	1.4
2022	2,234,949.00	1.4
2023	2,265,645.00	1.4
2024	2,296,565.00	1.4
2025	2,327,761.00	1.4
2026	2,359,412.00	1.4
2027	2,391,782.00	1.4
2028	2,424,865.00	1.4
2029	2,458,529.00	1.4
2030	2,492,684.00	1.4
2031	2,527,356.00	1.4
2032	2,562,716.00	1.4
2033	2,598,678.00	1.4
2034	2,635,016.00	1.4
2035	2,667,217.00	1.2

On an annual basis the total number of visitors to the Las Vegas Valley overwhelms the population of valley residents. However, it should be noted that most visitors stay in the Valley for only a short period of time and they represent a much smaller component of the total number of people in the Las Vegas Valley on any given day. For example, in 2000 the Las Vegas population is estimated (from Table 2-4) to be about 1.4 million people and from Figure 2-19 roughly 35 million visitors are expected during this year. Assuming that each visitor stays a week, this translates to about 700,000 people bringing total area population to about 2.1 million of which visitors account for about one third.

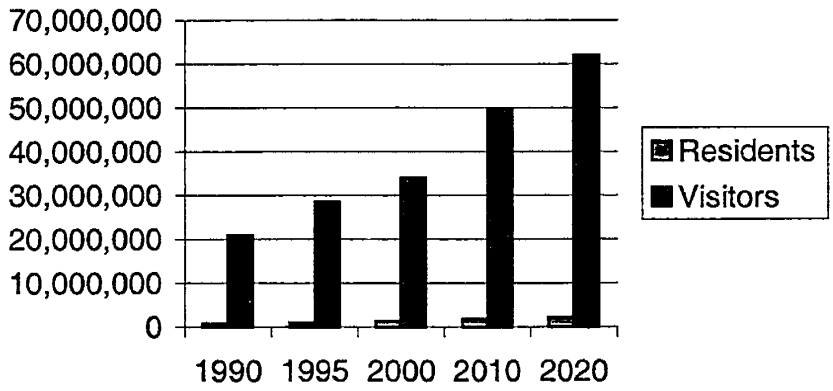


Figure 2-19. Comparison of Las Vegas population to annual number of visitors.

When this study was initiated, there had been continuing controversy over the widely varying population forecasts. Population forecasts for later years such as 2020 varied by enormous amounts, creating great uncertainty over the validity of projections of related variables such as transportation activity and emissions. Now, however, there is agreement among the regional planning agencies and therefore consistency in all of the estimates. Although any projection of conditions in the far future is inevitably uncertain, there seems to be no significant controversy over the estimates that are being made in terms of their being as accurate as is possible with current information. In addition, the agencies involved in the joint agreement with CBER have great stakes in ensuring the estimates are as accurate as feasible, and meet regularly to discuss and monitor the implementation of needed improvements. While it is inevitable that the estimates will change due to changing conditions, assumptions and modeling tools, the population projections being made are as good as could be expected.

VMT Growth Factors

Responsibility for estimating current and projected travel activity is assigned to the Regional Transportation Commission (RTC), which was designated in 1981 as the Metropolitan Planning Organization for urbanized Clark County by the Governor of the State of Nevada. Vehicle miles traveled (VMT), trips, and travel speeds are currently estimated using the TRANPLAN transportation model. The TRANPLAN model, developed by the Urban Analysis Group, forecasts average daily trips, miles, and hours of travel by roadway categories such as local roads, freeways, arterials, and ramps.

The REMI population forecasts, travel diaries from residents, and travel diaries from visitors, are all used in the model. While the TRANPLAN model is widely used in many U.S. urban areas, the Las Vegas is currently updating their modeling procedures to utilize a model called TRANSCAD, which is more flexible, greatly simplifies the examination of inputs and outputs, and lends itself more readily to geographically-based outputs and graphs.

The modeling region is currently broken down into 751 traffic analysis zones (TAZ). This area is being further disaggregated into 1,140 zones to provide additional detail. Factors such as population, employment, and housing type are all evaluated at the TAZ level. In order to accomplish this, the RTC:

- Collects detailed real estate development data;
- Collects major employer surveys;
- Develops development absorption projections; and
- Digitizes development boundaries into TAZ-level coverages.

Household population and employment in 18 industry sectors (such as construction, manufacturing, amusement, mining, etc) are estimated for each of the TAZ areas. These in turn depend on both population/employment estimates developed by the REMI model and assumptions regarding where particular land uses will be located. A model developed by the RTC called the Small Area Allocation Model (SAAM) is used to project population and employment levels for each TAZ. For population, the SAMM model projects population, housing units, occupancy rates, household sizes, and household income. For employment, the SAMM model considers land use categories including resort/casino; office; industrial; regional; community; other, and non-retail.

Once the land use categories, population, and employment estimates are allocated to each TAZ, trip productions (trips originating from a TAZ) and attractions (trips ending in a TAZ) are estimated for numerous resident and visitor trip purposes including:

- Home-based work;
- Home-based shopping;
- Home-based school;
- Home-based other;
- Non-home-based;
- Hotel-based conference/convention;
- Hotel-based business;
- Hotel-based gaming;
- Hotel-based other;
- Non-hotel-based gaming;
- Non-hotel-based other; and
- Air Passenger trips.

As noted earlier, each trip purpose estimate is modeled based upon the results of travel surveys and diaries for each of the trip purposes, land uses by traffic analysis zone, and trip generation by trip purpose. The approach is consistent with that used by other complex urban areas using modern transportation projection techniques.

The current model also considers that travel is made by varying modes including walking; auto (one person, two person and three or more persons); bike; transit; rail; and taxi. The model assumes an average 1.38 person per vehicle for regional trips by all of these travel modes. Projected trips by travel mode and trip purpose are shown in Tables 2-4 through 2-7.

Table 2-4. Daily trips by travel mode and trip purpose: 2000.

Trip Purpose	Home-based to Work	Home-based to Non-Work	Non Home Based	School	Total by Mode
Drive Alone	951,998	630,172	787,197	63,080	2,432,446
Shared-Ride	91,389	952,718	814,372	53,125	1,911,605
Transit	39,338	25,923	9,684	4,205	79,151
Total by Purpose	1,082,725	1,608,813	1,611,253	120,410	4,423,202

Table 2-5. Daily trips by travel mode and trip purpose: 2010.

Trip Purpose	Home-based to Work	Home-based to Non-Work	Non Home Based	School	Total by Mode
Drive Alone	1,564,399	910,962	1,035,786	145,774	3,656,921
Shared-Ride	202,231	1,434,214	1,135,382	127,153	2,898,980
Transit	105,412	43,367	18,013	9,919	176,710
Total by Purpose	1,872,043	2,388,543	2,189,181	282,846	6,732,612

Table 2-6. Daily trips by travel mode and trip purpose: 2020.

Trip Purpose	Home-based to Work	Home-based to Non-Work	Non Home Based	School	Total by Mode
Drive Alone	1,923,784	1,201,599	1,306,570	195,992	4,627,945
Shared-Ride	477,324	1,981,573	1,509,550	191,468	4,159,914
Transit	181,386	52,961	24,696	12,137	271,180
Total by Purpose	2,582,493	3,236,133	2,840,816	399,597	9,059,038

VMT forecast by the model are shown in Figure 2-20.

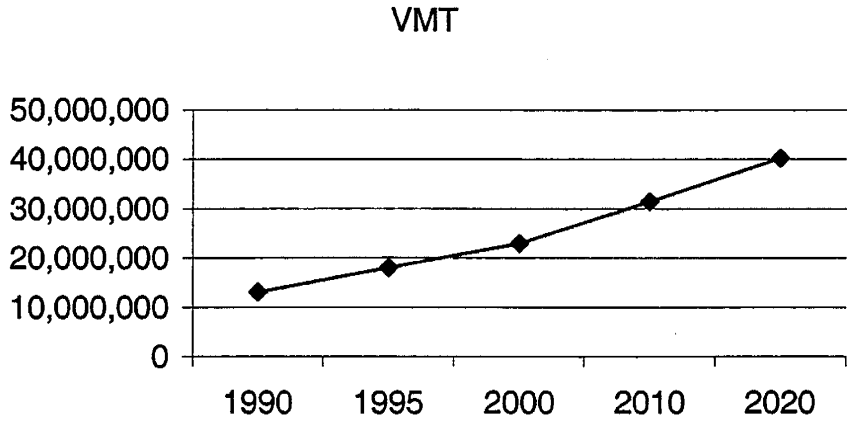


Figure 2-20. VMT estimates for 2000, 2010 and 2020. (RTC, January 2000).

Because of the large impact of tourism on travel volumes, the RTC has developed a submodel to the transportation model to estimate traffic volumes resulting from visitors. Table 2-7 presents visitor trips by purpose for the years 2000, 2010 and 2020.

Table 2-7. Daily visitor trips by travel mode for 2000, 2010 and 2020.

Year Travel Mode	2000	2010	2020
Rental Auto	162,701	264,227	313,087
Taxi	103,612	166,576	232,141
Public Transit	7,338	25,885	15,544
Shuttle Bus	12,533	13,800	9,711
Monorail	3,576	51,434	228,092
Walk	184,905	273,083	284,132
Total	**474,665**	**795,003**	**1,082,707**

These projections demonstrate expectations that visitor travel will more than double in the next twenty years. They also reflect expectations of the proposed monorail although the alignments are under discussion. It is likely that the monorail will move some trips currently utilizing transit and shuttle buses to this new mode.

In conclusion, travel projections are being made using state of the art projection techniques and are based on agreed-upon population and socioeconomic projections. As with population forecasts they will inevitably change due to unpredictable changes in socioeconomic conditions. However, the necessity for making projections for planning purposes makes it necessary to simply make and use the best projections possible.

EMISSION INVENTORY FOR STATIONARY AND AREA SOURCES

In this and the following two sections, the emission inventories for stationary and area, on-road mobile, and nonroad mobile sources, respectively, are discussed. Following those sections, a section summarizing current and future year emission inventories is presented which addresses the relative contributions of the different sources to emissions and therefore ambient levels of the different pollutants considered in this review.

OVERVIEW OF SECTION

This section reviews the stationary and area source inventory development procedures and future year inventories for these source categories. The stationary point emission source category includes a wide range of industrial activities which include:

- Aggregate and mining operations;
- Electrical power generation;
- Sewage treatment plants;
- Cement plants;
- Manufacturing facilities;
- Chemical production facilities; and
- Asphalt plants.

Similarly, the area emission source category also represents a diverse mix of sources that include:

- Construction activities;
- Paved and unpaved road dust;
- Disturbed vacant lands;
- Petroleum storage and transport;
- Landfills;
- Vehicle refueling;
- Dry cleaning operations; and
- Paint and solvent usage.

There has been considerable controversy surrounding the accuracy of the stationary and area source emissions inventory for the Las Vegas Valley. As is discussed below, information collected in this study does give rise to some significant concerns with respect to the accuracy of the stationary and area source inventories for Clark County. Further, because of these uncertainties and other factors, it is not possible in this effort under SB432 to develop reasonable inventory projections for future years. Clearly, these issues need to be addressed because the current inventory is not generally suitable for use in determining the relative contribution of stationary and area sources to total emissions in Clark County. It is beyond the scope of this study to focus on specific examples of problems and inaccuracies. Furthermore, it is likely that such a focus would only serve to foster controversy over particular details without contributing to an overall understanding of, or solutions for, the problems identified below.

CURRENT METHODS FOR INVENTORY DEVELOPMENT

Stationary Point Source Inventories

Emission inventories for Clark County are periodically prepared by the Clark County Department of Comprehensive Planning for air quality planning documents. For the stationary source portion of these inventories, the Department relies on data prepared by the Clark County Health District. These data are drawn from stationary source databases that are maintained by the District. The District maintains stationary source databases primarily for permitting and billing purposes. Substantial portions of annual permit fees charged by the District to stationary sources are based on emissions levels. These emissions levels are calculated either by the District or by the reporting sources.

The District sends activity reporting forms annually to stationary source operators. For minor sources (i.e., those facilities that are not required to obtain federal Title V operating permits), the form asks for production or throughput data. For these sources, District staff compute annual emissions using default emissions factors published by the U.S. Environmental Protection Agency.[8] Title V sources are asked to report both production data and emissions data calculated by source operators. These operators are advised to use either AP-42 default emissions factors, source test data, or continuous emissions monitor data as the basis for computing emissions. The choice of emissions factors is left to the source operators. It does not appear that the Health District performs formal spot checks or other types of audits on these emission factors for accuracy or appropriateness.

Activity reporting forms are mailed annually to approximately 1,700 stationary source operators. In 1999, approximately 65% of these operators returned these forms within the specified time period. Only some of the forms returned by the Title V sources are reviewed to verify the use of appropriate emissions factors. Data from the non-Title V sources was keyed into the stationary source database without review. Prior the advent of the annual reporting form system in 1997, stationary source emissions were estimated for emission inventory purposes on a potential to emit basis instead of an actual emission basis. As a result, emission

[8] Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, U.S. Environmental Protection Agency, September 1995.

inventories prepared prior to 1998 could significantly overstate actual emission values for stationary sources, assuming the emission factors are appropriate. None of the stationary source databases contain information on the seasonal distribution of potential or actual emissions.

Emissions inventories with respect to fossil fuel-fired utility boilers are prepared by the Nevada Department of Environmental Protection. Emissions from these facilities are computed by Department staff on the basis of production and monitoring information supplied by the boiler operators.

The stationary source databases maintained by the Clark County Health District are fragmented and not well organized. Databases are maintained separately, for example, for combustion equipment, cooling towers, industrial production equipment, and internal combustion engine electrical generators. The combustion equipment database contains records pertaining to industrial, commercial, and institutional facilities. The listing of sources in this database is exhaustive, ranging from utility gas turbines to special effects flares operated at outdoor casino displays. Many of the data fields in these records are blank, however, and others contain data that is out-of-range (e.g., annual operating hours in excess of several hundred thousand, for example) or obviously in error (e.g., annual NOx emissions of greater than 6,400 tons from a 21 MMBtu boiler fired with natural gas).

The best available estimates of stationary source emissions for Clark County on peak emission days, extrapolated to a base year of 2000, are presented in Table 2-8.

Table 2-8. Design day 2000 stationary source emission inventory (tons/day)

VOC[1]	NOx[1]	CO[1]	PM_{10}[2]
11.0	13.6	5.5	5.4

[1]UAM Modeling Analysis of the Clark County/Las Vegas Valley Area, Technical Support Document, for June 11, 1993; ICF Kaiser; March 1996; extrapolated to a 2000 base year.
[2]Particulate Matter (PM_{10}) Attainment Demonstration Plan, Las Vegas Valley Non-Attainment Area, Clark County, Nevada, for March 11, 1994; Clark County Department of Comprehensive Planning; August 1997; extrapolated to a 2000 base year.

Area Source Inventories

Emission inventories for area sources are also periodically prepared by the Clark County Department of Comprehensive Planning. Area sources are those that are small individually, but which are distributed extensively across the urbanized area and which, collectively, have the potential to produce substantial emissions.

For some categories of area sources, the emission inventory is prepared from the bottom up; for other categories, a top-down approach is used. A bottom-up emission inventory is prepared by cataloging data from each of a large number of small but similar sources, and summing together the emissions contributions to produce an area-wide total for the source category. This approach was used to compute emissions from small combustion equipment, gasoline service stations, and dry cleaning establishments, among others, for which the Clark County Health District issued individual permits and collected site-specific operations data.

For these source categories, emissions data in the air quality plans were calculated by the Health District and reported to the Department of Comprehensive Planning.

The discussion of strengths and weaknesses of emissions data prepared by the Health District for stationary sources also applies to emissions data for area sources. While the numbers of sources in an area source category for which data records are prepared by the Health District are sizable, many individual records contain blanks or questionable data. This outcome is primarily due to the lack of an adequate quality assurance/quality control program applicable to emissions databases maintained by the District.

The top-down emissions inventory approach is one that computes emissions first on an areawide basis, and then disaggregates this data on a geographical or source subcategory basis. Source categories for which this approach was used include windblown dust, paved and unpaved road use, and residential fuel use, among others. Typically, emissions inventories for these sources were prepared by Clark County Department of Comprehensive Planning on the basis of areawide activity data supplied by other governmental entities.

The top-down emissions inventory approach as used in Clark County suffers from a different set of weaknesses from those discussed for stationary sources earlier. Because the Department of Comprehensive Planning does not have regulatory authority over the area sources for which it directly compiles emissions estimates, the Department has difficulty in obtaining accurate information on areawide activity levels for these sources. Often, the Department receives data from other agencies that constitute only rough estimates of activity levels because careful enumeration or quantification by the reporting agency has not been performed. In addition, the emissions factors used by the Department to compute emissions from activity data, especially in the fugitive dust arena, are not always well researched and do not represent the best and most current information available. More often than not, default emission factors from EPA's AP-42 emission factor compendium are used when research time or source characteristic data are not readily available. This latter deficiency is primarily due to the limited number of staff available in the Department available to prepare emissions inventories. The end result is that emissions inventories for non-permitted sources also suffer from questionable accuracy.

A significant deficiency in the emission inventories prepared for Clark County is the lack of a micro-area emission inventory (microinventory) of PM_{10} sources near monitoring sites recording violations of the 24-hour ambient air quality standard. EPA guidance for PM_{10} attainment plans recommends that modeling techniques be used to quantify the emission contributions of sources near sites where peak PM_{10} levels are recorded. Because peak 24-hour concentrations in the Las Vegas Valley are dominated by fugitive dust sources, it is imperative that this process of estimating emissions from sources close to violation monitoring sites and using chemical mass balance and dispersion modeling techniques to determine the relative contributions from identified sources be implemented in order to appropriately assess the levels of controls needed to attain the standard. While progress has been made in developing microinventories and conducting modeling, this effort needs to be carried to completion for any attainment strategy to be assured of success.

The most recent estimates of area source emissions in Clark county on peak emission days extrapolated to a 2000 base year, are presented in Table 2-9. The air quality plans and

analyses from which these estimates were generated report emissions for different base years than the one selected for this report (2000). As a result, the base year 2000 emissions were calculated by interpolation between the emissions levels reported for earlier base years and those forecast for future years. For the NOx and VOC inventories, the ratios of annual average daily emission rates reported for an earlier base year were applied to the calculated area source emission total for 2000 to produce a breakdown of individual area source category contributions. Where control programs have been introduced since the earlier base years, the control efficiencies estimated in the plans for future years were applied to the 2000 uncontrolled emissions levels to produce corrected base year 2000 emissions.

Table 2-9. Design day 2000 area source emission inventory (tons/day).

Source	VOC	NOx	CO	PM_{10}
Motor Vehicle Tire Wear				2.2
Paved Road Dust				21.9
Unpaved Road Dust				7.6
Construction Activity				256.2
Disturbed Vacant Land				193.9
Off-road Racing				0.5
Fuel Combustion		1.5	0.2	
Solvent Use	21.6			
Petroleum Transfer	4.4			
Waste Disposal	16.8			
General Aviation	2.8	0.8	0.7	
Miscellaneous	1.1	0.1	2.3	1.1
Total	46.8	2.4	3.1	483.4

Sources: UAM Modeling Analysis of the Clark County/Las Vegas Valley Area, Technical Support Document; ICF Kaiser; March 1996.

Particulate Matter (PM_{10}) Attainment Demonstration Plan, Las Vegas Valley Non-Attainment Area, Clark County, Nevada; Clark County Department of Comprehensive Planning; August 1997.

Carbon Monoxide Air Quality Implementation Plan, Appendix A, Emission Inventory, Las Vegas Valley Non-attainment Area, Clark County, Nevada, Clark County Department of Comprehensive Planning, August 1999.

FUTURE YEAR INVENTORIES

The current stationary and area sources inventories need to be improved before it will be possible to make reasonable estimates of future emissions from these source categories. For perspective, however, EPA inventory development guidance specifies that many sources should be projected to future levels by directly scaling to population, employment, housing and traffic levels. If this approach were applied *all* sources then emissions would greatly increase; potentially to same extent as population and vehicle travel. Between 2000 and 2025, population in Clark County is expected to grow by 68% (from approximately 1.4 million to approximately 2.3 million). During this period of time, the number of vehicle-miles-traveled per year will grow by an even greater fraction as people drive increasing distances to work.

Unfortunately, in the absence of improved base year inventories all that can be said is that the future year emission inventories for stationary and areas sources in Clark County will be measurably affected by growth in source activity levels. Implementation of planned future

federal and state control measures will not affect emissions of these sources in a significant way. Because of the uncertainties in the stationary and area source emission inventories discussed earlier, a quantitative analysis of growth in these inventories over future years was not conducted. Quantitative analyses performed in support of the 1999 Carbon Monoxide Plan, a 1996 ozone modeling study, and the 1997 PM_{10} plan are the most current sources of quantitative values for future years. For perspective, the following paragraphs provide information on the estimates provided in these studies. However, these values must be interpreted as rough and directional rather than as representative of actual projected emissions.

With respect to CO, the 1999 CO plan indicates that there will be no growth in stationary source CO emissions over the period from 2000 to 2020 and while area source CO emissions will approximately double. However, even with this level of growth, applied to both inventories, stationary and area sources will remain as only incidental contributors to total CO emissions in the Las Vegas Valley.

Turning to ozone precursors, the only relatively recent source of NOx and VOC emissions projections for stationary and area sources to future years is contained in the 1996 UAM study. In this study, growth factors for specific stationary and are source categories used to forecast emissions through 2010 were developed using data from Bureau of Economic Analysis. Overall, this study forecast an increases of about 30% in stationary and area source emissions of both VOC and NOx from 2000 to 2010.

An inventory for PM_{10} emissions from stationary and area sources was most recently reported in the 1997 PM_{10} plan. These estimates will be undergoing revision over the course of the year (2000) in support of the new PM_{10} plan. Based on the 1997 plan, the situation with respect to the distribution of PM_{10} emissions among various source categories is significantly different from that of the gaseous criteria pollutants discussed above. The PM_{10} emission inventory will be dominated by area fugitive dust sources both now and in the future. In 2000, fugitive dust sources are estimated to account for approximately 95% of all anthropogenic (man-caused) PM_{10} emissions on an annual basis, and approximately 98% on a peak day basis[9]. The remaining emissions are attributed to stationary sources and motor vehicle wear and exhaust sources. Although PM_{10} projections for area sources to future years are not yet available, fugitive dust sources will continue to dominate the PM_{10} emission inventories in the future, and attainment of the ambient air quality standards will depend almost exclusively upon control measures applicable to these sources.

The limited number of federal control programs scheduled for future adoption will affect a few stationary and area sources in Clark County, but will not have an impact on attaining ambient air quality standards. New regulations will flow from the federal New Source Performance Standard and National Emissions Standards for Hazardous Air Pollutant programs, but these regulations will reduce emissions of hydrocarbons and toxic pollutants which currently do not affect Clark County's attainment status. The new regulations will reduce emissions from automobile refinishing operations, consumer products, industrial and commercial waste incinerators, benzene storage, phosphoric acid manufacturing, pharmaceutical manufacturing, and secondary aluminum operations, among others. No future state control programs that

[9] Particulate Matter (PM_{10}) Attainment Demonstration Plan, Las Vegas Valley Non-attainment Area, Clark County, Nevada, Clark County Department of Comprehensive Planning, August 1997.

would impact stationary or area sources in Clark County are currently proposed. Some local programs related to vacant land and unpaved road shoulders are currently under consideration.

Summary

As described in detail above, there are a multitude of general problems that have been identified with the stationary and area source inventories for VOC, CO, PM_{10} and NOx emissions in Clark County. In order to correct these problems, a comprehensive review of the data and methods underlying the existing inventory will be required to identify specific problems with data and/or inventory methods. Once this effort is complete, it is expected that another large scale effort will be required to acquire the data necessary to generate reliable inventories for the pollutants of interest on a yearly, seasonal, daily and even hourly basis for past, current, and future years. These inventories are needed to accurately assess the importance of stationary and area source emissions of VOC, NOx and PM_{10}, the effectiveness of current control programs and the need for additional controls to achieve air quality goals.

EMISSIONS INVENTORY FOR ON-ROAD MOBILE SOURCES

The on-road mobile source category consists of all types of on-road vehicles. This includes:

- motorcycles (MC);
- gasoline and Diesel-powered passenger cars (denoted as LDGV and LDDV, respectively);
- gasoline and Diesel-powered light-duty trucks (denoted as LDGT and LDDT, respectively), and
- gasoline and Diesel-powered heavy-duty vehicles (denoted as HDGV and HDDV, respectively).

The later category, HDDVs includes urban buses as well as large Diesel trucks.

The estimation of emissions from on-road motor vehicles is important from a number of viewpoints. First, these rates are used to develop regional emission inventories, which give an indication of progress made toward meeting (or maintaining compliance with) ambient air quality standards. Second, they are important in determining where efforts should be placed to control air pollution in a community. Finally, on-road motor vehicle emission estimates are used to determine if regional transportation plans and projects are consistent with, and conform to, the State Implementation Plan.

Because of the need to accurately predict motor vehicle emission rates, the U.S. Environmental Protection Agency (U.S. EPA) has expended considerable resources over the past 20 years on data collection programs that help to quantify the rate at which gaseous pollutants are emitted by individual categories of motor vehicles under a variety of operating conditions. The latest "official" version of EPA's on-road motor vehicle emission factors model are MOBILE5b and PART5. MOBILE5b is based on the MOBILE5a model. Although MOBILE5b was released in October 1996, the changes made to the model were minimal relative to the MOBILE5a model which was released in March, 1993.

Since the early 1990's, a significant amount of data has been collected on in-use emissions performance, vehicle operational characteristics, and the impact of fuel parameters on emissions. Because of that, EPA is now in the process of developing the MOBILE6 and PART6 models as replacements for MOBILE5b to reflect the latest knowledge on vehicle emissions. In fact, a version of the MOBILE5b model was developed to estimate the emissions impacts of more stringent new vehicle standards and fuel specifications. As discussed in the documentation prepared for that model, which is termed the Tier 2 Analysis Tool (T2AT), this modified MOBILE5b model was developed as a "surrogate for MOBILE6," addressing four primary areas of development: (1) basic emission rates, (2) off-cycle effects, (3) fuel effects (primarily sulfur), and (4) fleet characteristics. However, at present there is no PART6 analog of T2AT.

As discussed in detail below, the on-road emission modeling methodology used in this study was based on the use of T2AT and PART5. As a result of a T2AT based approach, the gaseous pollutant inventory therefore represents the most reasonable approximation of the on-road motor vehicle inventory that will be generated for the Las Vegas Valley using MOBILE6. This approach was taken because although greatly delayed, MOBILE6 will likely form the basis of any future assessment of the need for and benefits of local control measures targeting VOC, CO, or NOx emissions from on-road motor vehicles.

Figures 2-21a and 2-21b present, respectively, the summer and winter on-road vehicle VOC emission inventories for the Las Vegas Valley over the period from 2000 to 2025. These inventories include both exhaust and evaporative VOC emissions. As shown in Figures 2-21a and 2-21b, summer VOC emissions from on-road vehicles are higher during the summer months, primarily because of greater evaporative emissions. In both seasons, VOC inventories are dominated by gasoline powered passenger cars and light-duty trucks. Overall, VOC emissions in the Las Vegas Valley are projected to decline somewhat over the period from 2000 to 2025 despite the growth forecasted to occur in the Valley as the result of more stringent new vehicle emission standards imposed at the federal level.

As shown in Figures 2-22a and 2-22b, a similar situation exists with respect to CO emissions from on-road motor vehicles. However, because CO emissions will be reduced to a lesser degree than VOC emissions by federal new vehicle emission standards, there is a modest increase in CO emissions projected to occur in the 2015 to 2025 period. In addition, it is interesting to note that estimated CO emissions from on-road vehicles are higher during the summer months during the near term than they are during the winter months. This is the result of increased air conditioner use during the summer months as well as the winter gasoline program in effect in Clark County. Although this result might seem inconsistent with the fact that mobile sources are the dominant source of CO emissions and the highest ambient CO concentrations are observed during the winter, it is not as the meteorological conditions conducive to high CO concentrations are experienced in the Las Vegas Valley only during the winter months.

In contrast to VOC and CO emissions, HDDVs represent a major source of on-road NOx emissions in the Las Vegas Valley as shown in Figures 2-23a and 2-23b and will by 2025 account for roughly half of the on-road NOx inventory with the other half being attributable to gasoline-fueled passenger cars and light-duty trucks. However, as was the case with VOC and CO, the emission reductions attributable to more stringent federal emission standards for new

vehicles will be able to offset the increase in emissions associated with the projected growth in the Las Vegas Valley and NOx emissions will decrease by about 25% over the period from 2000 to 2025.

Finally as shown in Figure 2-24, exhaust PM_{10} emissions from on-road vehicles are also dominated by heavy-duty Diesel vehicles and the inventory will by about 20% higher in 2025 relative to 2000 due to increased truck traffic. As insufficient data are available to develop summer and winter estimates of on-road PM_{10} emissions the values presented in Figure 2-24 represent year round average emissions.

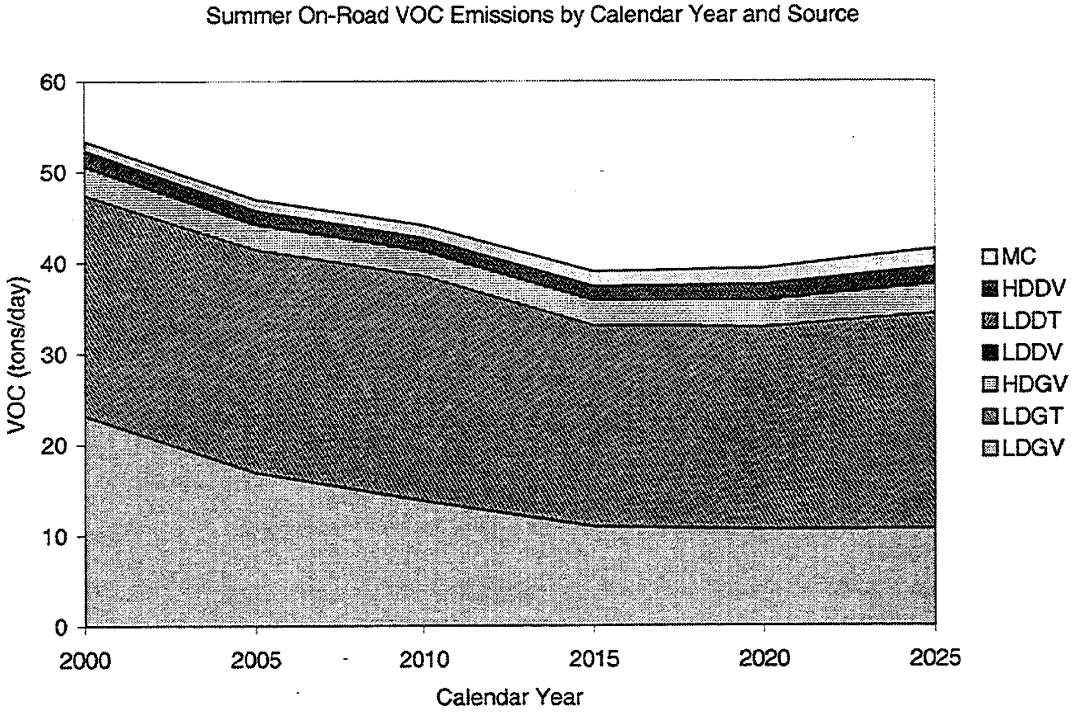


Figure 2-21a. Summer on-road VOC emissions by calendar year and source.

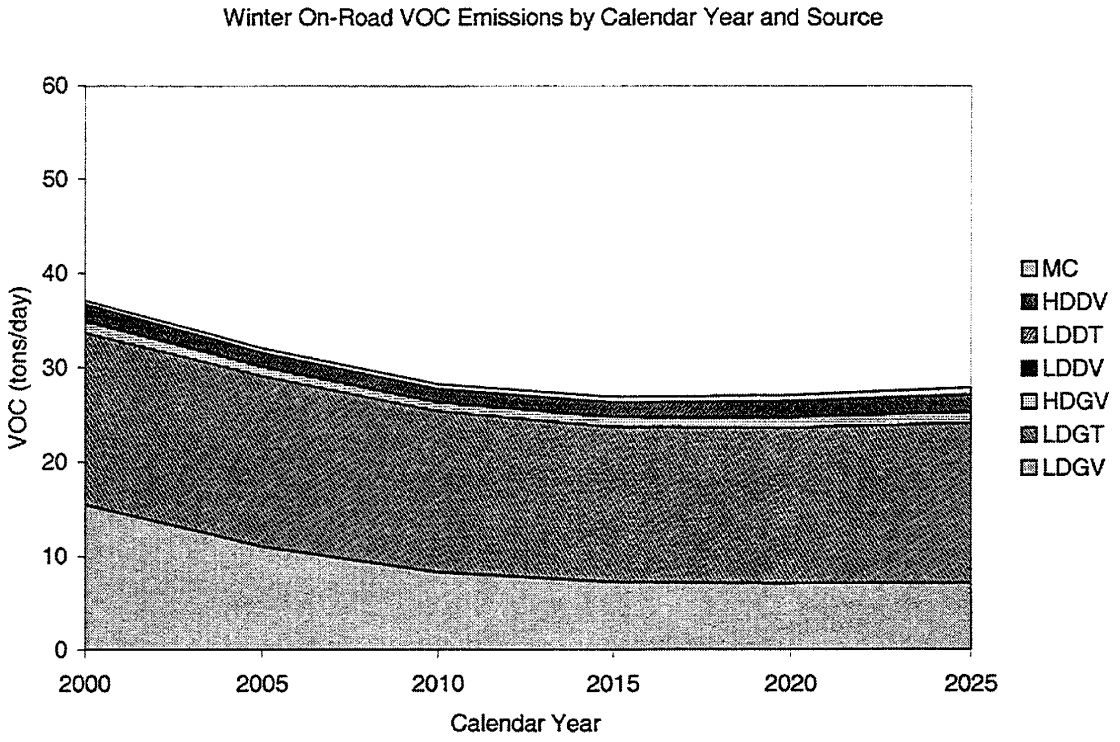


Figure 2-21b. Winter on-road VOC emissions by calendar year and source.

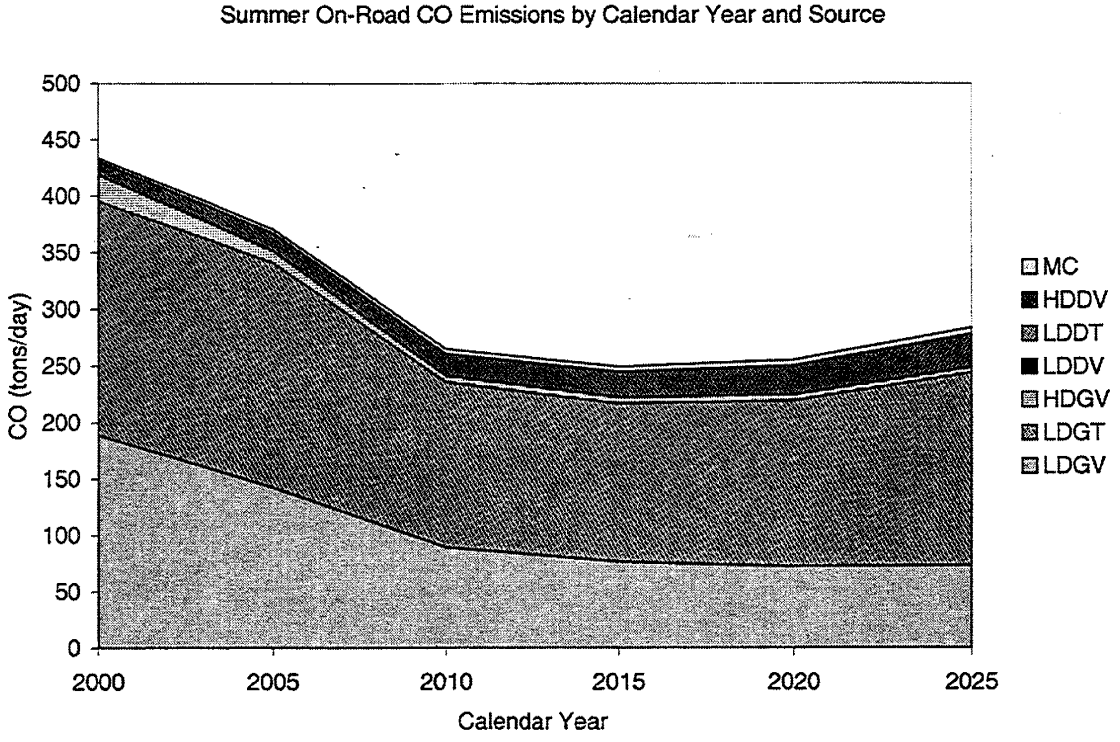


Figure 2-22a. Summer on-road CO emissions by calendar year and source.

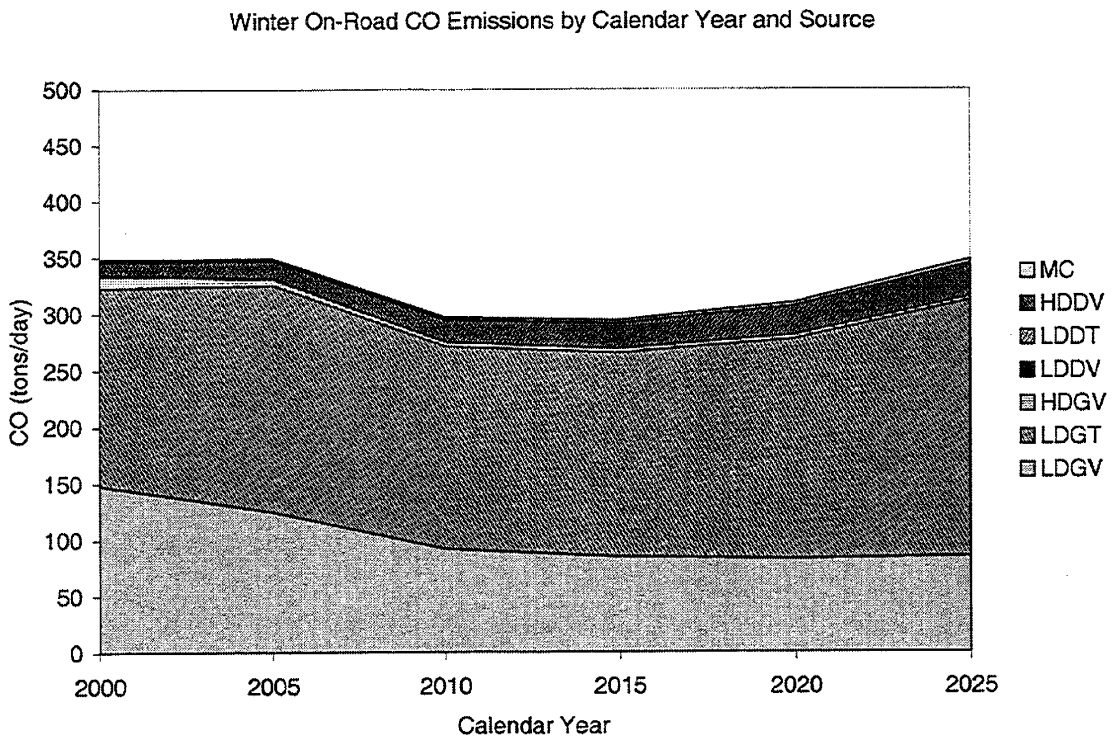


Figure 2-22b. Winter on-road CO emissions by calendar year and source.

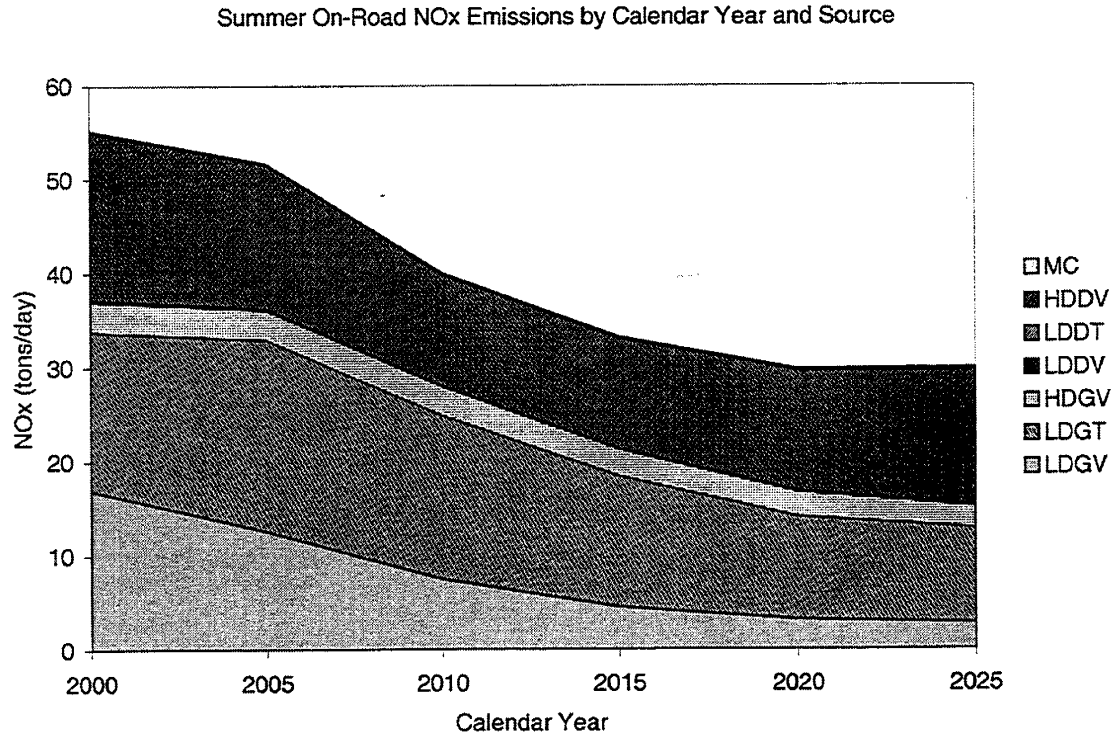


Figure 2-23a. Summer on-road NOx emissions by calendar year and source.

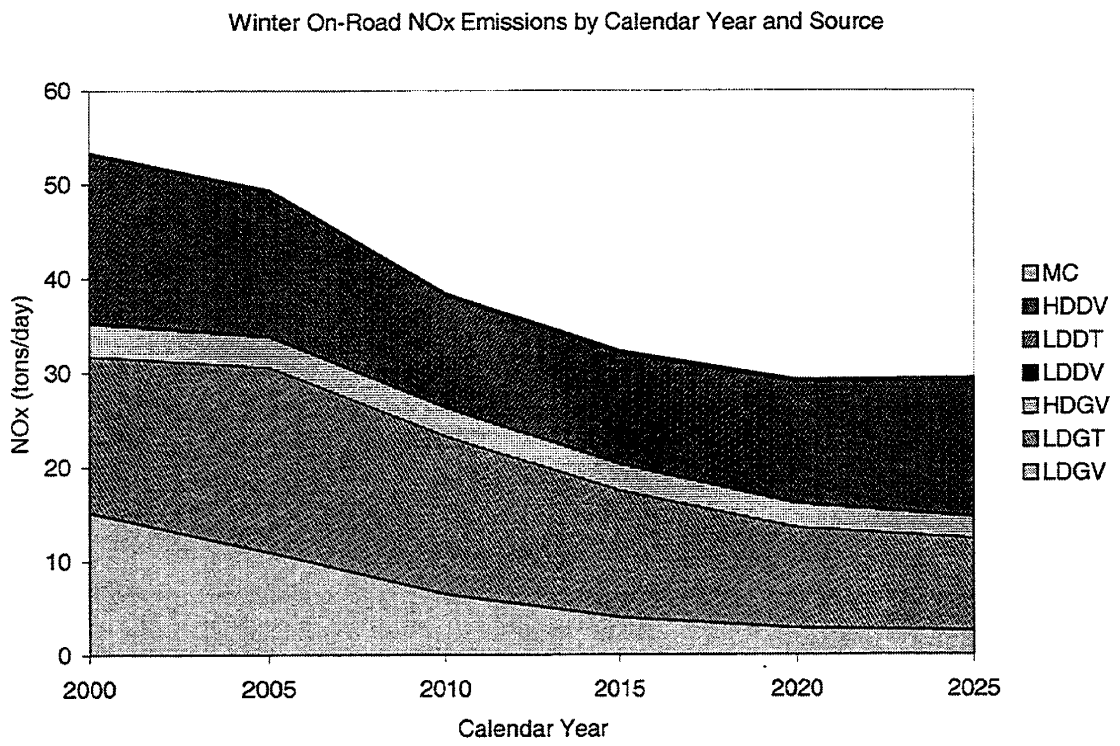


Figure 2-23b. Winter on-road NOx emissions by calendar year and source.

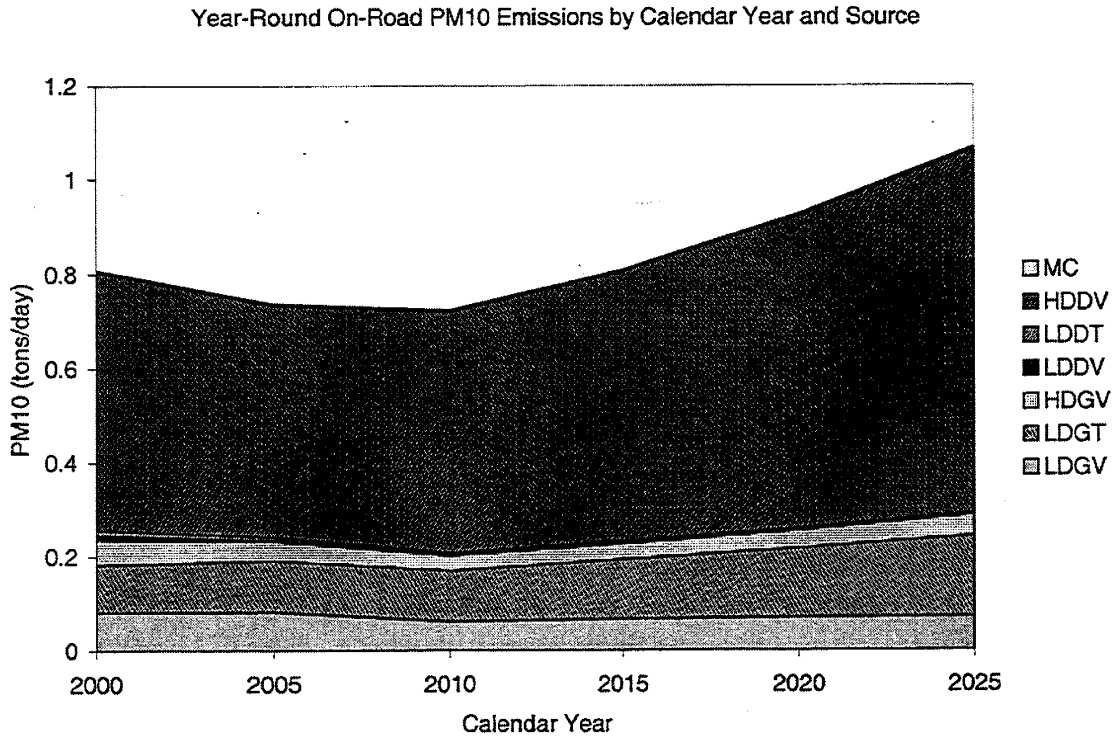


Figure 2-24. Year-round on-road PM_{10} emissions by calendar year and source.

METHODS FOR INVENTORY PREPARATION

The development of an emissions inventory for on-road motor vehicles is a matter of multiplying an emission rate (e.g., grams per mile, or g/mi) by a measure of vehicle activity (e.g., average daily vehicle miles traveled, or VMT). The analytical tool approved by EPA to generate motor vehicle emission rates is the MOBILE model, while MPOs are generally responsible for developing vehicle activity estimates. The Clark County Regional Transportation Commission is responsible for generating the on-road motor vehicle activity estimates for Clark County and the County Comprehensive Planning Agency uses those estimates in combination with the U.S. EPA's MOBILE5a emission factor model to develop the on-road mobile source inventory. This section of the report focuses on the development of updated motor vehicle emission rates and the resulting inventory generated by combining MOBILE-based emissions estimates with VMT estimates.

The latest "official" version of EPA's on-road motor vehicle emission factors model is MOBILE5b, which was based on the MOBILE5a model. Although MOBILE5b was released three and one-half years after MOBILE5a, the changes made to that model were minimal, consisting primarily of (1) revisions to account for the effect of regulations that had been finalized after the release of MOBILE5a, and (2) revisions to inspection and maintenance (I/M) program inputs to reflect program designs being pursued by states that were not included in the MOBILE5a model. The most substantive change between MOBILE5a and MOBILE5b was a result of including the impacts of the gasoline detergent additive regulation in the MOBILE5b model.

Most of the algorithms included in MOBILE5b are based on data and analyses performed seven years ago. Since that time, a significant amount of data has been collected on in-use emissions performance, vehicle operational characteristics, and the impact of fuel parameters on emissions. Over the past two to three years, EPA has been in the process of updating MOBILE5b to reflect the latest knowledge on vehicle emissions. In fact, a modified version of the model was developed to estimate the emissions impacts of possible Tier 2 controls at the time the original Tier 2 Study was released in the spring of 1998. As discussed in the documentation prepared for that model (Koupal, 1998) which was termed the Tier 2 Analysis Tool (T2AT), the modified MOBILE5b model was developed as a "surrogate for MOBILE6," addressing four primary areas of development: (1) basic emission rates, (2) off-cycle effects, (3) fuel effects (primarily sulfur), and (4) fleet characteristics.

The modeling performed by EPA for the Tier 2 rule was refined between the time T2AT was released in the spring of 1998 and when the Tier 2 rule was finalized in late-1999. For this project, Sierra made use of the data and methodologies developed by EPA for the final Tier 2 rule to update the MOBILE5 emissions estimates that have been used historically to generate on-road motor vehicle inventories in Clark County. Most of the methods and data used by EPA for the Tier 2 analysis mirror those proposed for MOBILE6 and are described in the following documents:

- "Development of On-Highway Inventory Adjustment Factors Used in the Tier 2 Final Rule Air Quality Analysis" (Koupal, Oct. 1999);

- "Development of Light-Duty Vehicle Inventory Estimates in the Final Rulemaking for Tier 2 and Sulfur Standards" (Koupal, Dec. 1999); and

- "Procedures for Developing Base Year and Future Year Mass and Modeling Inventories for the Tier 2 Final Rulemaking" (Pechan, 1999).

In addition to the above written material, EPA has made available a series of Excel spreadsheets that were used to generate emission rates for this rulemaking.

One shortcoming of EPA's Tier 2 analysis is that the focus was on HC and NOx emissions. As a result, the CO estimates prepared by Sierra for this effort made use of the draft MOBILE6 documentation available on EPA's Internet Web Site. However, every effort was made to maintain consistency between the HC/NOx methodologies and the CO methodologies. This is described in the discussion that follows.

Exhaust Emissions Estimates

Light-Duty Gasoline Cars and Trucks - One of the most substantive changes being made to the MOBILE model with the release of MOBILE6 will be related to modeling exhaust emissions from light-duty cars and trucks. In particular, the following parameters are being added or updated:

- Base emission rates are being revised to reflect improvements in emission control system durability observed in the mid- to late-1980s;

- Vehicle emissions are being segregated into running exhaust (g/mi) and a start offset (g/trip);

- "Off-cycle" impacts, consisting of aggressive driving and air conditioning usage, are being accounted for in the revised modeling methodology;

- Fuel sulfur impacts are explicitly accounted for in the model; and

- Speed correction factors are being substantially revised based on new in-use cycles that account for both vehicle speed and roadway type.

In addition, the impacts of the Supplemental Federal Test Procedure (SFTP) regulations, the National Low Emission Vehicle (NLEV) program, and the Tier 2 standards will be accounted for in MOBILE6.

The first step in generating light-duty vehicle exhaust emission rates for this project was to review the materials that EPA prepared for the Tier 2 rulemaking as well as documentation published by EPA on MOBILE6 revisions. This review led to the development of a methodology that is very similar to that being proposed for MOBILE6 and should result in much more accurate emissions estimates than those used previously to develop emissions inventories for Clark County.

Four primary categories of vehicles were modeled in this effort: (1) pre-1981 model year vehicles; (2) Tier 0 vehicles (i.e., 1981 to 1993 model year); (3) Tier 1 vehicles; and (4) LEVs and Tier 2 vehicles. These vehicle categories were treated separately because they have different emissions characteristics, different responses to fuel sulfur levels, different off-cycle impacts, etc. To illustrate the methodology used for all vehicle categories, NMHC emissions from Tier1 light-duty gasoline vehicles (LDGVs) will be presented in the example below.

The basic exhaust emissions modeling approach that will be used by EPA in MOBILE6 will split the fleet into normal emitters and high emitters, where high emitters are generally defined as having emissions greater than two or three times the 50,000-mile certification standard.* Because MOBILE6 will separate starting and running emissions, these emission modes are treated separately. Emissions of high emitters are assumed to be constant with vehicle age (or mileage), while normal emitters are assumed to undergo a gradual increase in emissions as the vehicles age. Emissions of normals and highs are combined into a single emission rate (as a function of vehicle mileage) by applying an estimate of the fraction of normals and highs in the fleet at each mileage interval. Thus, although the high-emitter emission rate is constant (and normal emitters only have gradual deterioration), the overall fleet-average emission rate increases with vehicle mileage as more vehicles migrate from the normal emitter category to the high emitter category. The presence or absence of an I/M program impacts the fraction of normals and highs at each mileage interval, and therefore fleet emissions. To generate baseline emission rates for this project, Sierra assumed a non-I/M case. As discussed below, the impacts of I/M were accounted for separately in this analysis.

Table 2-10 outlines the LDGV NMHC emission rates for Tier 1 vehicles. Note that these estimates do not include the impacts of off-cycle operation, nor have they been corrected for fuel effects. The emission rates for normal and high emitters came from the spreadsheets developed by EPA for the Tier 2 rule, as did the estimated fraction of high emitters as a function of mileage. The inputs for NOx emissions were also based on the Tier 2 spreadsheets, while CO inputs were obtained from EPA's draft MOBILE6 documentation (Glover, 1999).

* Note that a third emitter category has also been defined by EPA, that of "repaired" vehicles. The emission rate of repaired vehicles is assumed to be 1.5 times the certification standard, which is intended to reflect malfunctions that were identified and repaired as a result of the on-board diagnostic (OBD II) system. The value of 1.5 times the certification standard was selected for the repaired vehicle emission rate because the OBD II regulations require malfunctions to be identified if they result in an emissions increase greater than 1.5 times the standard.

Table 2-10. LDGV NMHC running exhaust and cold start emission rates for Tier 1 vehicles non-I/M -- not corrected for aggressive driving or fuel effects.

Age	Odometer	Fraction	Running Exhaust (g/mi)			Cold Start Offset (g/trip)		
(Years)	(10,000 mi)	Highs	Normal	High	Flt-Ave	Normal	High	Flt-Ave
0	0.00	0.017	0.022	0.384	0.029	1.075	18.380	1.377
1	1.49	0.019	0.026	0.384	0.033	1.261	18.380	1.580
2	2.91	0.029	0.030	0.384	0.040	1.437	18.380	1.930
3	4.26	0.047	0.034	0.384	0.050	1.605	18.380	2.398
4	5.54	0.065	0.037	0.384	0.060	1.765	18.380	2.846
5	6.75	0.082	0.040	0.384	0.068	1.917	18.380	3.273
6	7.91	0.099	0.043	0.384	0.077	2.062	18.380	3.676
7	9.01	0.115	0.046	0.384	0.085	2.199	18.380	4.065
8	10.06	0.131	0.049	0.384	0.093	2.329	18.380	4.433
9	11.05	0.146	0.051	0.384	0.100	2.454	18.380	4.783
10	12.00	0.161	0.054	0.384	0.107	2.572	18.380	5.117
11	12.90	0.175	0.056	0.384	0.114	2.684	18.380	5.435
12	13.75	0.189	0.058	0.384	0.120	2.790	18.380	5.736
13	14.57	0.202	0.060	0.384	0.126	2.892	18.380	6.024
14	15.34	0.215	0.062	0.384	0.132	2.988	18.380	6.298
15	16.07	0.227	0.064	0.384	0.137	3.080	18.380	6.559
16	16.77	0.239	0.066	0.384	0.142	3.167	18.380	6.806
17	17.43	0.251	0.068	0.384	0.147	3.249	18.380	7.042
18	18.06	0.262	0.070	0.384	0.152	3.328	18.380	7.267
19	18.66	0.272	0.071	0.384	0.156	3.403	18.380	7.481
20	19.23	0.282	0.073	0.384	0.161	3.474	18.380	7.684
21	19.78	0.292	0.074	0.384	0.165	3.542	18.380	7.878
22	20.29	0.302	0.075	0.384	0.169	3.606	18.380	8.062
23	20.78	0.311	0.077	0.384	0.172	3.667	18.380	8.237
24	21.25	0.319	0.078	0.384	0.176	3.725	18.380	8.404
25	21.69	0.328	0.079	0.384	0.179	3.780	18.380	8.563

The next step in the analysis was to account for off-cycle impacts. Again, this was calculated based on the methodologies and data used in the Tier 2 modeling. Because off-cycle operation affects normal emitters differently than high emitters, the off-cycle impact was calculated separately for each emitter category before combining the results by the fraction of normals and highs in the fleet. In addition, the impact of aggressive driving is calculated separately from air conditioning. As an example, consider a four-year-old normal-emitting vehicle from Table 2-10, which has an NMHC running exhaust emission rate of 0.037 g/mi. (The running exhaust emission rate is denoted by "LA4" in the equations below, reflecting the fact that the basis for the running exhaust emission rate is the LA4 cycle). The g/mi aggressive driving and air conditioning impacts are then calculated as:

- Aggressive Driving: $0.305*LA4 - 0.02492*LA4^2$
  $0.305*0.037 - 0.02492*0.037^2 = 0.011$ g/mi

- Air Conditioning: $0.039 + 0.0151*(LA4 + Agg\ Drv)$
  $0.039 + 0.0151*(0.037 + 0.011) = 0.040$ g/mi

Note that the aggressive driving increment must be calculated first because that is used along with the running exhaust emission rates to calculate the air conditioning increment. Again, because CO was not included in the Tier 2 modeling, it was necessary to review the relevant draft MOBILE6 documentation for the appropriate inputs (Brzezinski, et al, 1999) (Koupal, March 1998).

For this analysis, the air conditioning impacts were kept separate from the running exhaust and the cold start components. That is because the air conditioning emission factor calculated by the above equation is a "full-usage" factor that must be scaled down by the fraction of the fleet equipped with functioning air conditioning units and by compressor-on time (which is a function of ambient temperature and humidity).

The next adjustment made to the running, off-cycle, and cold start emission rates was for fuel impacts. This was a two-part adjustment, one that accounted for non-sulfur impacts (which varied according to whether federal reformulated gasoline is being used), and the other that accounted for fuel sulfur levels different from 30 ppm. The HC and NOx adjustments were based on the Tier 2 spreadsheets, while CO relied on equations formulated for use in MOBILE6 (Rao, 1999). Note that the fuel impacts are a function of emitter level, and those corrections were applied prior to combining the normal and high emitters by the fraction of highs in the fleet. The fuel impacts were applied to running exhaust emissions, the cold start offset, and to the air conditioning increment. For this analysis, two sulfur levels were modeled – 65 ppm and 30 ppm. The 65 ppm level was based on a review of fuel survey data collected in Las Vegas in 1999, (AAM, 1999) (NAAM, 1999) while the 30 ppm level is consistent with the requirements of the Tier 2 rule.

A final correction made to the running exhaust and air conditioning emissions estimates prior to combining normals and highs was for speed. In the Tier 2 modeling, this was accomplished by estimating the fraction of VMT over various roadway types at different speeds, and generating a single average speed correction for the U.S. as a whole. Although this approach was attractive from the perspective that it minimized calculation effort, there was concern that certain control measures might require emissions by speed estimates. As a result, speed corrected emission rates were developed for the following roadway types:

- Local roads (a single speed of 12.9 mph is assumed for MOBILE6);
- Ramps (a single average speed of 34.6 mph is assumed for MOBILE6);
- Arterials (2.5, 5.0, 10.0, ... 30.0 mph); and
- Freeways (2.5, 5.0, 10.0, ... 65.0 mph).

Consistent with the approach proposed for MOBILE6, local roads and ramps are not assumed to vary by average speed, while both arterials and freeways are assumed to have speed corrections that vary with speed. However, at speeds above 30 mph, the arterial and freeway speed corrections are equivalent, and there was no need to generate speed-corrected emission factors above 30 mph for arterials. Finally, because the speed correction factors (SCFs) are also a function of emission level, SCFs are calculated and applied separately to normal and high emitting vehicles prior to combining the normals and highs by the fraction in the fleet.

An illustration of the speed correction factor for two emission levels (0.037 g/mi and 0.384 g/mi, corresponding to normals and highs for Tier 1 vehicles) during freeway operation is shown in Figure 2-25. As observed in that figure, the speed correction factors for speeds below about 25 mph are very similar for both normal emitters and high emitters. Above 30 mph, however, the two curves deviate, with normal emitters having a larger speed correction relative to high-emitting vehicles. Nevertheless, because the SCF is a multiplicative factor, the speed-corrected emission rates of normal-emitting vehicles are still well below those of high-emitting vehicles.

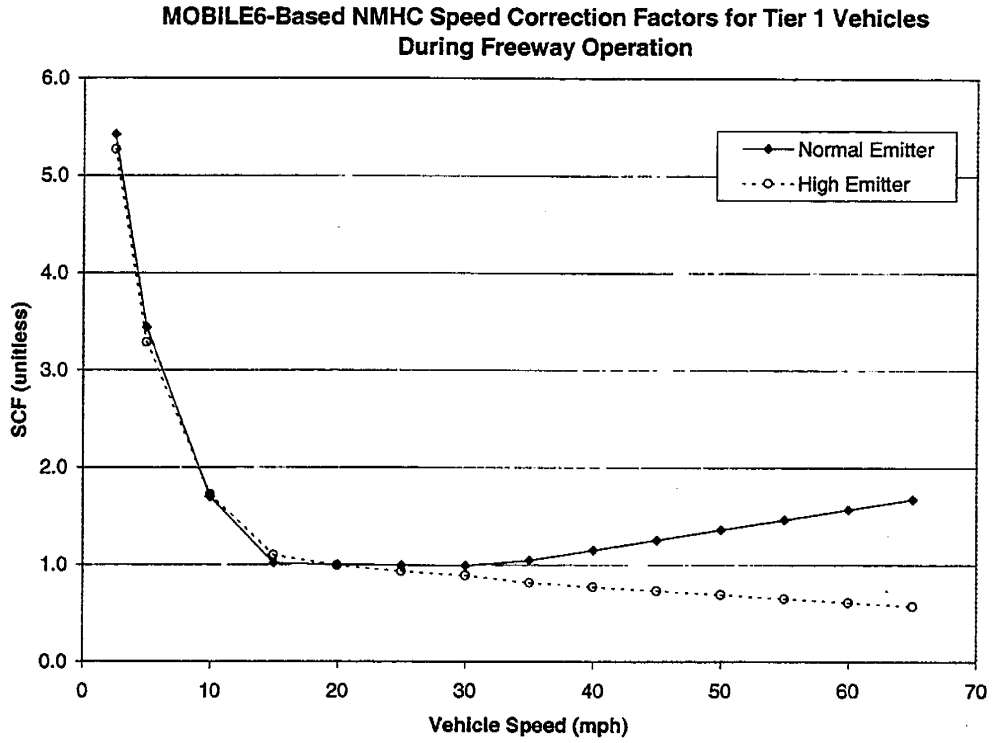
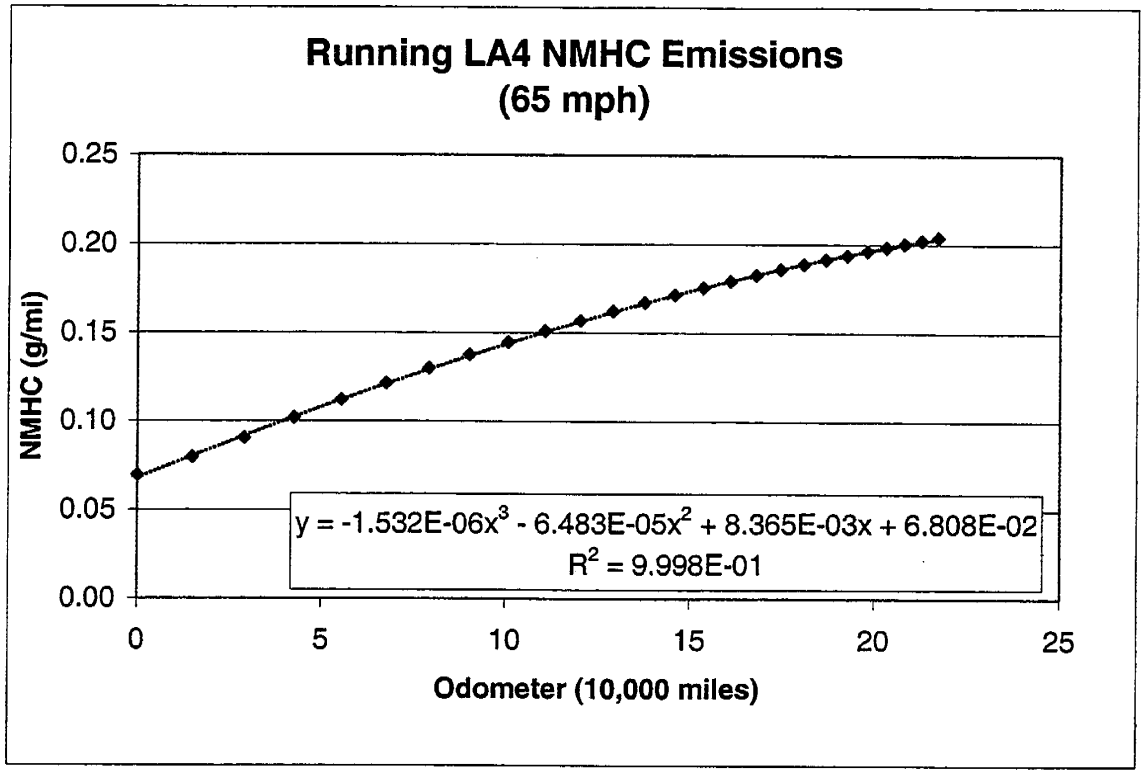


Figure 2-25. MOBILE6-based NMHC speed correction factors for Tier 1 vehicles during freeway operation.

Once the running exhaust emission rates of normal- and high-emitting vehicles were adjusted for aggressive driving, fuel effects, and speed effects, composite emission factors (by vehicle age) were developed by weighting the normals and highs by their occurrence in the fleet. The resulting emission rates were then correlated against mileage to arrive at a simple equation that could be used to reflect Tier 1 vehicle emission rates at any mileage. A sample of this analysis is shown in Figure 2-26, which presents the data points and regression lines for running LA4 NMHC emissions (at 65 mph) and cold start NMHC emissions. A cubic equation was used to reflect emissions as a function of vehicle mileage. This form was selected because it was best able to match the individual points for the widest range of pollutants, vehicle categories, and vehicle speeds.



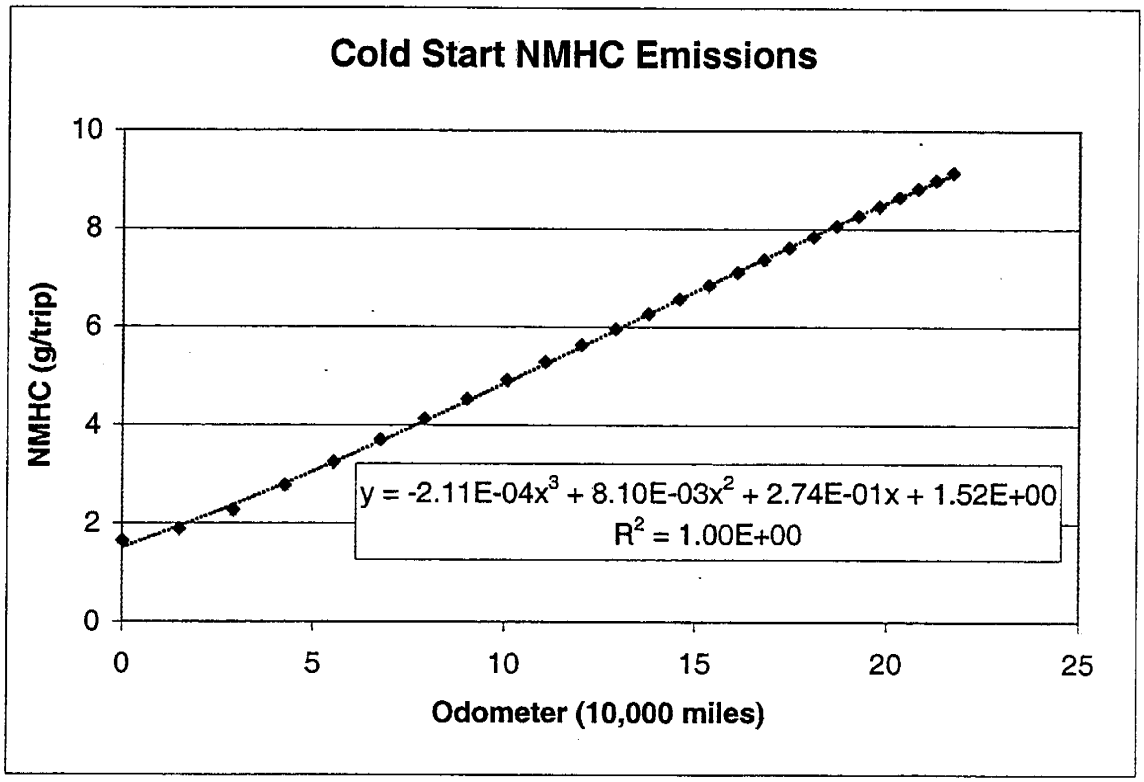


Figure 2-26. Changes in running and cold start NMHC emissions as a function of vehicle odometer.

Cubic equations were generated as described above for each vehicle category (i.e., pre-1981, Tier 0, Tier 1, LEV, and Tier 2), for each pollutant, and for cars versus trucks. Separate equations were also generated for running exhaust (which included aggressive driving effects and were speed corrected), cold-start exhaust, and full-usage air conditioning impacts. These equations were then used to generate model year-specific equations based on the market share of each vehicle category in the fleet. For example, the 1994 model year was the first year in which Tier 1 vehicles were phased in. Thus, the 1994 model year cubic equations were generated by weighting the Tier 1 results by 40% and the Tier 0 results (multipoint fuel injection technology only) by 60%. This same approach was followed to generate cubic equations for LDGV, LDGT1, and LDGT2 vehicle classes for model years 1968 to 2010. Overall, a total of 8,901 separate equations were developed for running exhaust emissions (and the A/C increment, since that is also subject to speed correction) for each sulfur level.* A total of 387 equations were developed for the cold start offset, which does not need to be speed corrected.

The resulting equations were stored in an ASCII file that was used as input to a FORTRAN routine that generated fleet-average emission rates for LDGV, LDGT1, and LDGT2 vehicle classes by calendar year. That routine is described later in this section of the report.

Adjustments for SFTP and on-board diagnostic (OBD) II Regulations - Depending on the model year and vehicle type, adjustments were made to the emission factors described above to account for the impact of both the SFTP and OBD II regulations. SFTP regulations were phased in beginning with the 2001 model year (for LEV-category vehicles), and the OBD II regulations were assumed to be fully implemented in the 1996 model year. Adjustments for these regulations were made prior to the development of the cubic equations that related vehicle mileage to emission rate. That is because these regulations had different impacts on normal- versus high-emitting vehicles.

To account for the SFTP regulations, the aggressive driving and air conditioning increments were reduced by a percentage that was a function of pollutant, vehicle type, emitter category, and standard level (i.e., Tier 1, LEV, or Tier 2). These percentages were spelled out in the Tier 2 model spreadsheets for HC and NOx, while the CO reductions were based on estimates contained in the original Tier 2 analysis from the spring of 1998.[1] The reductions are summarized in Table 2-11, which shows that SFTP controls are assumed by EPA to be about half as effective on high-emitting vehicles as they are on normal emitters.

The benefits of the OBD II regulations were accounted for in the Tier 2 modeling effort by assuming that 85% of defects leading to high emissions are identified by the system, and that vehicles are repaired to 1.5 times the certification standard level. In addition, EPA has made assumptions regarding owner response to MIL illumination that depends on whether the vehicle is in an I/M area or a non-I/M area. For vehicles subject to an I/M program, EPA has assumed that 90% of the vehicles with illuminated MILs are repaired. On the other hand, owner response to MIL illumination in non-I/M areas is a function of vehicle mileage:

* (43 MY) x (3 pollutants) x (3 vehicle classes) x (local roads @ 1 speed + ramps @ 1speed + arterials @ 7 speeds + freeways @ 14 speeds) = 8,901

Table 2-11. Benefits of SFTP regulations.

Pollutant	Vehicle Type/ Standard Level	Aggressive Driving		A/C	
		Normal	High	Normal	High
NMHC	LDV - LEV/Tier2	98%	49%	100%	50%
	LDV - Tier 1	88%	44%	100%	50%
	LDT2 - LEV	99%	50%	100%	50%
	LDT3/4 - LEV	92%	46%	100%	50%
	LDT - Tier 1	88%	44%	100%	50%
NOx	LDV - LEV/Tier2	92%	46%	71%	36%
	LDV - Tier 1	78%	39%	50%	25%
	LDT2 - LEV	93%	47%	85%	43%
	LDT3 - LEV	84%	42%	80%	40%
	LDT4 - LEV	82%	41%	79%	40%
	LDT - Tier 1	78%	39%	50%	25%
CO	All LDV	71%	36%	78%	39%
	All LDT	71%	36%	64%	32%

- 0 to 36,000 miles - 90% response rate
- 36,000 to 80,000 miles - 10% response rate
- over 80,0000 miles - 0% response rate

The rationale that EPA provides to support the above assumptions is that full-coverage warranties are in-effect during the 3-year/36,000-mile period, so there is no reason for a motorist to ignore the MIL. Beyond that point, OBD II is assumed to have very low effectiveness because without an I/M program, there is nothing to force the repair of failing vehicles.

As noted above, the baseline emission rate equations developed for this effort were based on a non-I/M case. I/M benefits, including those that are a result of OBD II systems, were applied after-the-fact. The methodology used to apply these benefits is summarized below.

Fleet-Average Emission Rates for LDGV, LDGT1, and LDGT2 Vehicle Classes - A fleet-average g/mi emission rate for a particular point in time (e.g., January 1, 2000) is estimated by first determining the emission rate of each individual model year making up the fleet (which is typically assumed to be 25 model years), weighting each model year by its travel fraction (with newer vehicles making up a larger share of the population and being driven more), and then summing the results over all model years. These calculations are normally performed within the MOBILE model. However, for this study, a stand-alone FORTRAN program was developed that read in the base emission rate cubic equations (described above), applied the appropriate odometer reading to calculate emissions by vehicle age, applied the travel fractions by vehicle age, and then summed the results. In addition, the results were corrected for temperature, oxygenated fuels (CO only), and air conditioner usage rates. Details of these calculations are described below.

As noted previously, the base emission rates for LDGVs, LDGT1s, and LDGT2s were generated separately for running exhaust, air conditioning effects, and for cold start emissions. Emission rates were developed as a function of vehicle mileage so that different calendar years could be analyzed without having to recalculate model year-specific emission rates. Instead, average odometer estimates (by vehicle age) could be applied to the correlation equations to generate model year-specific emission rates for each analysis year considered. For this study, average odometer estimates and VMT fractions by model year were generated with the MOBILE5b model, using Clark County information on registrations by model year (CCHD, Feb. 2000) and using MOBILE6 estimates of annual mileage accrual rates (Acurex, 1997). The MOBILE5b input file used to generate the odometer by age and travel fraction by age estimates is contained in Appendix A.

A summary of the calculation used to generate model year emission rates and fleet-average emissions estimates from the regression equations developed above is shown in Table 2-12, which presents running exhaust NMHC emissions in calendar year 2005 for LDGVs operating on local roads. As an example, consider a 2000 model year vehicle in 2005. Based on MOBILE6 estimates, that vehicle would have 64,484 miles. Using this mileage (divided by 10,000) in the regression equation, the following is obtained:

$$NMHC = 0.057 + (0.008 * 6.4484) + (2.06x10^{-4} * 6.4484^2) - (4.64x10^{-6} * 6.4484^3)$$

$$NMHC = 0.116 \text{ g/mi}$$

Table 2-12. Sample calculation of calendar year 2005 fleet-average running exhaust NMHC emission rate for LDGVs operating on local roads.

	From MOBILE5b			Regression Equations from Sierra Analysis[a]			NMHC
Model Year	Travel Fraction	Odometer	Int	a (M)	b (M^2)	c (M^3)	Emissions (g/mi)
2005	0.0205	1864	0.016	0.004	2.41E-04	-4.68E-06	0.017
2004	0.1269	11160	0.016	0.004	2.41E-04	-4.68E-06	0.021
2003	0.1112	25519	0.017	0.004	2.45E-04	-4.77E-06	0.029
2002	0.0981	39169	0.019	0.004	2.53E-04	-4.97E-06	0.040
2001	0.0932	52147	0.020	0.005	2.59E-04	-5.11E-06	0.050
2000	0.0830	64484	0.057	0.008	2.06E-04	-4.64E-06	0.117
1999	0.0723	76212	0.057	0.008	2.06E-04	-4.64E-06	0.129
1998	0.0469	87362	0.057	0.008	2.06E-04	-4.64E-06	0.141
1997	0.0416	97961	0.057	0.008	2.06E-04	-4.64E-06	0.153
1996	0.0415	108038	0.057	0.008	2.06E-04	-4.64E-06	0.164
1995	0.0412	117617	0.064	0.018	8.55E-05	-3.32E-06	0.286
1994	0.0511	126724	0.065	0.036	3.84E-05	-4.48E-06	0.520
1993	0.0429	135381	0.070	0.053	1.17E-05	-6.04E-06	0.775
1992	0.0346	143611	0.070	0.053	9.44E-06	-5.99E-06	0.817
1991	0.0227	151435	0.073	0.052	3.03E-05	-6.41E-06	0.850
1990	0.0132	158873	0.074	0.053	2.78E-05	-6.32E-06	0.895
1989	0.0119	165944	0.086	0.055	5.15E-05	-6.54E-06	0.978
1988	0.0120	172667	0.087	0.053	7.44E-05	-7.06E-06	0.988
1987	0.0083	179057	0.185	0.092	-7.27E-04	8.89E-06	1.654

1986	0.0051	185132	0.182	0.091	-6.44E-04	7.45E-06	1.684
1985	0.0048	190908	0.248	0.066	4.26E-03	-1.42E-04	2.075
1984	0.0040	196399	0.262	0.058	5.60E-03	-1.81E-04	2.190
1983	0.0029	201618	0.275	0.050	6.91E-03	-2.20E-04	2.291
1982	0.0027	206580	0.247	0.220	-1.60E-04	-1.68E-04	3.244
1981	0.0075	211297	0.246	0.228	-8.21E-04	-1.54E-04	3.246
					Fleet-Average NMHC Emission Rate:		0.289

As shown in Table 2-12, this calculation was performed for each model year, and the results were weighted by the travel fraction of each model year to arrive at an overall fleet-average emission rate, which is shown in the lower right corner of the table.

Several points are worth noting with respect to that table:

- Emission rates drop in 2001 as the NLEV program takes effect and the SFTP regulations are phased in.
- Emission rates drop in 1996 as the Tier 1 standards are fully phased in and OBD II regulations are implemented.
- Emission rates drop in 1988 although there is no standard change. This is a result of multipoint fuel-injected vehicles (which are substantially more durable than older technology vehicles) making up a larger share of the market.

I/M Adjustments - Although the emission factor estimates generated for the Tier 2 study included the impacts of I/M, the emission factor equations prepared for this effort assume a non-I/M case. That is because the Tier 2 analysis assumed a fairly robust I/M program would be in place, consisting of IM240 testing for pre-OBD II vehicles and a very effective OBD II check for 1996 and later model years. Simply using those estimates as-is would grossly overstate the benefits of the Clark County I/M program. On the other hand, it is not appropriate to apply the I/M credits generated with the MOBILE5b model to the revised emission factors developed in this study. That is because those credits were based on different assumptions regarding the mix of highs and normals in the fleet.

To estimate I/M credits for this study, MOBILE5b runs were used to discount the MOBILE6-based IM240 credits generated for the Tier 2 modeling effort to reflect the decentralized, two-speed idle (TSI) program currently in effect in Clark County. This was accomplished by running MOBILE5b twice B once with parameters matching the IM240 model program used in the Tier 2 analysis and once with parameters matching the current TSI program. The ratio of the MOBILE5b (TSI/IM240) credits were then applied to the I/M credits generated by EPA for the Tier 2 analysis. For example, if the Tier 2 analysis I/M credit was estimated to be 25% for a ten-year-old vehicle, and the IM credits were calculated by MOBILE5b to be 45% under an IM240 program and 18% under the current TSI program, then the resulting MOBILE6-based TSI credit was calculated as:

$$IM_Cred_{(M6\text{-}TSI)} = IM_Cred_{(M6\text{-}IM240)} \times (IM_Cred_{(M5b\text{-}TSI)}/IM_Cred_{(M5b\text{-}IM240)})$$

$$IM_Cred_{(M6\text{-}TSI)} = 0.25 \times (0.18/0.45) = 10\%$$

The above calculations were performed for 1981 and later vehicles not equipped with OBD II systems. For OBD II vehicles, separate I/M credits were developed from the Tier 2 spreadsheets by modifying the assumptions related to owner response to MIL illumination. Because the I/M program in Clark County is decentralized (and subject to the inefficiencies associated with all decentralized programs), the assumption that all vehicles subject to I/M would have a 90% owner response rate to MIL illumination was reduced to 50% for vehicles with more than 36,000 miles. It is felt that this is a more accurate representation of compliance under a decentralized program. Finally, for pre-1981 model years (which were not considered in the Tier 2 study), MOBILE5b credits were used directly because EPA has indicated that it will not revise the I/M credits for pre-1981 model year vehicles in MOBILE6.

Air Conditioning Adjustments - The air conditioning emission factors developed above reflect emission rates under full-usage conditions. However, it is rare that the A/C compressor will operate 100% of the time during a trip. Further, not all vehicles in the fleet are equipped with A/C units, and some units are no longer operational. Thus, two adjustments were made to the full-usage A/C factors developed in this effort: (1) an adjustment for ambient conditions; and (2) and adjustment for market penetration and malfunction rates.

As part of the Tier 2 modeling effort, EPA developed an air conditioning usage factor that is a function of ambient temperature:[2]

$$A/C\ Activity\ Factor = -3.63 + 0.072465*(Temp) - 0.000276*(Temp)^2$$

where temperature is in degrees F and the resulting activity factor is applied to the full-usage A/C increment. The A/C activity factor is a multiplicative factor that is a maximum of 1.0 at 109°F (and above) and a minimum of 0 at 68°F (and below).

The other adjustment performed to the full-usage A/C emission rates was to account for market penetration of A/C units (a function of model year) and the fraction of units that are non-operational (a function of model year and whether Freon or R-134a was used as the refrigerant; EPA assumes that the expense of Freon may cause some motorists to forego repairs). The market penetration rates and malfunction rates were derived from a draft report prepared by EPA for MOBILE6 (Koupal, 1998).

Other Adjustments to Fleet-Average LDGV, LDGT1, and LDGT2 Emission Rates - A final set of adjustment factors was applied to the MOBILE6-based fleet-average light-duty gasoline vehicle emission rates to account for ambient temperature effects, wintertime oxygenated fuels, the split between cold-start trips and hot-start trips, and to convert the NMHC estimates to a VOC basis.

The temperature adjustments were developed by running MOBILE5b under two different modes B 100% cold start and 100% hot stabilized operation B at 75°F and at the ambient temperature reflective of the summer and winter runs. The mean daily summer temperature for calculating exhaust emissions was based on a diurnal temperature profile of 81° to 106°F

(based on inputs developed for Clark County as part of EPA's "Trends" inventory development efforts), and the mean winter temperature for calculating exhaust emissions was based on a diurnal temperature profile of 36° to 64°F (from the MOBILE5b input file received from Clark County). Fleet-average multiplicative factors for cold-start and running emissions were developed from the MOBILE5b runs for 2000 and 2010. The 2005 estimates were interpolated from the 2000 and 2010 estimates, and the 2010 estimates were used for calendar years beyond 2010. Note that the Serious Area CO model was used for the CO estimates because that model has been revised to include the most recent estimates of the effects of the 1994 Cold CO emission standards. The multiplicative temperature correction factors resulting from this analysis are summarized in Table 2-13.

Oxygenated fuel effects were also generated based on the Serious Area CO model. That model was used because it has MOBILE6-based oxygenated fuel correction factors built into it and because the base emission rates have been modified to reflect MOBILE6. The model was run under winter temperature conditions both with and without oxygenated fuel (at 3.5 wt%). The results were used to generate CO emission reduction estimates for each calendar year of interest. Those reductions are summarized in Table 2-14 and indicate diminishing impacts from oxygenated fuel usage as newer technology vehicles enter the fleet.

Table 2-13. Temperature Correction Factors for gasoline light-duty cars and trucks.

Calendar Year	Season	Operating Mode	HC	CO	NOx
2000	Summer	Running	1.09	1.40	1.04
		Cold Start	0.97	0.97	0.97
	Winter	Running	1.18	1.30	1.14
		Cold Start	1.68	2.10	1.09
2010	Summer	Running	1.00	1.00	1.06
		Cold Start	1.00	1.03	0.98
	Winter	Running	1.18	1.30	1.13
		Cold Start	1.60	2.00	1.09

Table 2-14. MOBILE6-based CO benefits of oxygenated fuel usage for 3.5 wt% oxygen.

	Benefit by Vehicle Class		
Calendar Year	**LDGV**	**LDGT1**	**LDGT2**
2000	0.184	0.197	0.241
2005	0.139	0.140	0.177
2010	0.117	0.096	0.118
2015	0.112	0.082	0.096
2020	0.111	0.078	0.089
2025	0.112	0.079	0.089

The next adjustment performed to the fleet-average emission rates was to modify the cold-start offset to reflect a mix of hot starts and cold starts. For MOBILE6, a continuous start algorithm will be included that will apply a correction factor to the complete cold start emission rate to account for soak times of one minute up to 12 hours (assumed to be a completely cold start) (Glover, 1999). However, ENVIRON is not aware of soak time distribution data for the Las Vegas area and therefore used the average start adjustments that EPA developed for the Tier 2 study. These factors were 0.491 for NMHC and 0.610 for NOx. Because the soak function curves for HC and CO are so similar, ENVIRON assumed that the mean start adjustment factor for CO was 0.50. The soak function curves for catalyst-equipped vehicles are illustrated in Figure 2-27.

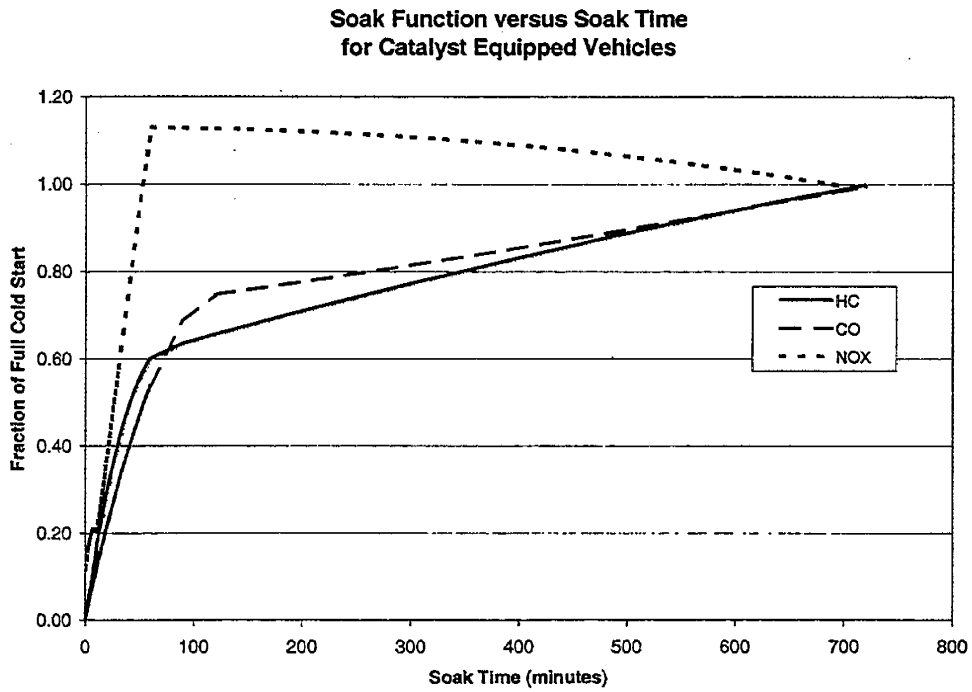


Figure 2-27. Soak function versus soak time for catalyst equipped vehicles.

A final adjustment performed to the fleet-average emission rates was to convert the exhaust NMHC estimates to a VOC basis. A conversion factor was developed by running MOBILE5b while specifying NMHC and then VOC output. The results were used to generate a multiplicative correction factor (approximately 1.02) that was applied to the NMHC results obtained in this study.

Heavy-Duty Gasoline Vehicles and Diesel Vehicles - The bulk of the on-road motor vehicle modeling effort in this study was devoted to generating MOBILE6-based estimates of light-duty gasoline vehicle (cars and light trucks) emission rates. That is because those vehicle classes are responsible for the vast majority of VMT in most urban areas, and therefore it is important to generate accurate estimates of in-use emissions from those vehicles. However, that is not to say the remaining vehicle classes were ignored in this effort. To the extent possible, emission estimates of heavy-duty gasoline vehicles (HDGVs), light-duty Diesel vehicles (LDDVs), light-duty Diesel trucks (LDDTs), and heavy-duty Diesel vehicles (HDDVs) were modified to reflect EPA's plans for MOBILE6.*

The basic approach used to estimate emissions for HDGVs, LDDVs, LDDTs, and HDDVs was to run MOBILE5b for the calendar years of interest (2000, 2005, 2010, 2015, 2020, and 2025) and then apply the MOBILE5b-to-MOBILE6 adjustment factors that EPA prepared to support the national inventory development efforts for the Tier 2 rule. Those adjustment factors are tabulated in the "Procedures" report[4] that was released with the final Tier 2 rule. In general, the MOBILE5b-to-MOBILE6 adjustments were developed for 1996, 2007, and 2030, which were the target analysis years in the Tier 2 modeling effort. Thus, adjustment factors for the current effort had to be interpolated from the Tier 2 results.

As an example, the VOC M5b-to-M6 adjustment factors are summarized in Table 2-15. As observed in that table, significant reductions in exhaust VOC emissions are predicted for all vehicle classes relative to the MOBILE5b estimates. This is a result of implementation of tighter controls (including the Tier 2 rule) that were not accounted for in the MOBILE5b model.

As a final note, the HDDV NOx estimates were treated somewhat differently. The baseline emission rates were generated with MOBILE5b by invoking alternative base emission rate equations that reflect the 2.5 g/bhp-hr HC + NOx standard in 2004. This was done according to EPA guidance (EPA, 1998). These results, which were generated as a function of vehicle speed, were then adjusted to account for the increase in emissions associated with ECU programming that causes the HDDVs to go into a fuel economy mode during some in-use conditions. This so-called "defeat device" adjustment was presented in the Tier 2 "Procedures" report[4] as a function of roadway type and vehicle speed. Factors were presented for 1996, 2007, and 2030; the factors used in this report were determined through interpolation.

* Note that motorcycle emissions were not adjusted from MOBILE5b values in EPA's modeling performed for the Tier 2 rule. Given the small contribution of this source to overall fleet emissions, MOBILE5b emission estimates were used directly in the analyses prepared for this report.

Table 2-15. Exhaust VOC MOBILE5b-to-MOBILE6 adjustment factors.

Source	Calendar Year	Adjustment Factor by Vehicle Type HDGV	LDDV	LDDT	HDDV
Tier 2 "Procedures" Report	1996	0.899	1.231	1.385	1.000
	2007	0.396	0.939	0.907	0.413
	2030	0.122	0.355	0.494	0.316
Interpolated from Above and Used in Current Study	2000	0.716	1.125	1.211	0.787
	2005	0.487	0.992	0.994	0.520
	2010	0.360	0.863	0.853	0.400
	2015	0.301	0.736	0.763	0.379
	2020	0.241	0.609	0.674	0.358
	2025	0.182	0.482	0.584	0.337

Overall Calendar Year Fleet Emission Rates - Using the methodologies described above, MOBILE6-based exhaust emission rates were developed for seven of the eight vehicle classes considered by the MOBILE model for calendar years 2000 through 2025, in five-year increments. (Motorcycle emission rates were based directly on MOBILE5b estimates.) Once that was accomplished, overall fleet-average emission rates were generated by applying vehicle-class-specific travel fractions to the class-specific emission rates. The class-specific travel fractions developed for MOBILE6 and used in the Tier 2 modeling were also used in this study rather than the fractions historically used by Clark County in its MOBILE modeling. That is because the fractions used by Clark County appear to have an unreasonably high contribution from passenger cars relative to light-duty trucks. This is important from the perspective that light-duty trucks are certified to less stringent emission standards (until Tier 2 was adopted), and historically have demonstrated poorer emissions durability with vehicle age.

The Clark County-based VMT fractions are compared to the MOBILE6 fractions in Table 2-16. Note the decreasing contribution of LDGVs to overall fleet VMT over time in the MOBILE6 estimates. This is in stark contrast to the historical Clark County VMT fractions that assume LDGVs contribute 73.5% of overall fleet VMT. Our concern in using the Clark County estimate is that it does not appear to account for the large shift in vehicle sales from cars to light trucks (which include minivans and sport utility vehicles) that has occurred in the last ten years. Currently, new light-duty vehicle sales are split about evenly between cars and trucks, which is reflected in the MOBILE6 estimates but not in the Clark County estimates.

Table 2-16. VMT fractions by vehicle class MOBILE6 vs. historical Clark County estimates.

Source - Cal. Year	Vehicle Class							
	LDGV	LDGT1	LDGT2	HDGV	LDDV	LDDT	HDDV	MC
M6 - 2000	0.498	0.311	0.102	0.022	0.002	0.002	0.058	0.005
M6 - 2005	0.425	0.363	0.119	0.023	0.001	0.002	0.062	0.005
M6 - 2010	0.382	0.393	0.129	0.025	0.000	0.002	0.065	0.005
M6 - 2015	0.359	0.407	0.134	0.025	0.000	0.002	0.067	0.005
M6 - 2020	0.337	0.422	0.138	0.026	0.000	0.002	0.070	0.005
M6 - 2025	0.314	0.436	0.143	0.027	0.000	0.002	0.072	0.005
Clark Co.	0.735	0.123	0.067	0.012	0.019	0.007	0.027	0.010

Evaporative Emissions Estimates

Evaporative emissions estimates were prepared for this study with the MOBILE5b model. Similar to some of the exhaust estimates outlined above, MOBILE5b-to-MOBILE6 adjustment factors were applied to the MOBILE5b output. These adjustment factors were extracted from the "Procedures" report[4] and are intended to reflect the tighter evaporative standards adopted with the Tier 2 rule. Separate evaporative estimates were prepared for summer versus wintertime conditions. As noted above, the summer runs assumed a temperature profile of 81° to 106°F, while the winter runs used a diurnal temperature profile of 36° to 64°F. Summer RVP was assumed to be 8.3 psi, based on the 1999 AAM fuel survey, while winter RVP was assumed to be 9.0 psi, consistent with Clark County rules.

The MOBILE5b input files used to generate the summer and winter evaporative emission rates are contained in Appendix B. The following items are worth noting with respect to the inputs:

- MOBILE6-based mileage accumulation rates were used;
- Clark County specific registration fractions were used;
- refueling emissions are controlled by Stage II vapor recovery systems; and
- 1998 and later model year vehicles were modeled by applying pressure and purge I/M test benefits to these vehicles.

The latter input was intended to reflect the impact of evaporative OBD II systems on emissions from 1998 and later model year vehicles and is similar to the approach used by EPA to generate national inventories for the Tier 2 rule.* Although evaporative OBD II systems were

* Note that the baseline modeling performed for this study assumed the effectiveness of the evaporative OBD II check would be discounted because the current Clark County I/M program is decentralized. This is consistent with the approach taken for the exhaust estimates.

first introduced in the 1996 model year, this requirement was not fully phased in until the 1998 year.

PM10 Emissions Estimates

PM_{10} emissions were estimated using EPA's PART5 model, coupled with PM adjustment factors that EPA developed for the Tier 2 analysis. Again, emission rates were calculated for the study years of interest, and the adjustment factors (determined through interpolation of the 1996, 2007, and 2030 Tier 2 results) were applied to the results. The adjustment factors from the "Procedures" report were used directly for LDDV and LDDT emissions. However, the LDGV, LDGT1, LDGT2, and HDGV adjustment factors were modified to account for the lower baseline fuel (65 ppm S) in Las Vegas relative to the baseline fuel assumed in PART5 (340 ppm S). In fact, since the entire PM reduction associated with gasoline vehicles with the Tier 2 rule appears to be related to a decrease in particulate sulfate, the sulfate portion of the PM emission rate calculated by PART5 was simply reduced by 65/340 for the 2000 and 2005 calendar year runs (reflecting baseline control) and by 30/340 for the 2010 and later calendar year runs (reflecting Tier 2 control).

Inventory Estimates

VOC, CO, and NOx - Once the fleet-average g/mi emission rates were developed for all vehicle classes, pollutants, analysis years, and seasons (summer and winter), those results were combined with estimates of VMT to arrive at the baseline on-road motor vehicle inventory for Clark County. The VMT estimates used for this analysis were obtained from Clark County and reflect the estimates used in the CO conformity analysis as part of the Transportation Improvement Program. The VMT estimates were provided for 2000, 2010, and 2020, while inventory estimates for this study were prepared for 2000, 2005, 2010, 2015, 2020, and 2025; VMT for odd years was determined through interpolation and extrapolation. The VMT was provided by roadway type and speed, consistent with the methodology used to develop the emission factors.

To summarize, the following inputs and parameters are included in the baseline inventories:

- Fuel parameters (sulfur, RVP, and oxygenates) are specific to Clark County. Inventories for 2010 and beyond include 30 ppm sulfur fuel, consistent with the requirements of the Tier 2 rule.
- The current I/M program in Clark County was modeled (i.e., annual, decentralized two-speed idle testing).
- The impacts of OBD II were accounted for beginning with the 1996 model year.
- Off-cycle impacts (i.e., aggressive driving and air conditioning usage) are included in the emission factors, as are the impacts of the SFTP regulations on the control of off-cycle emissions.

- The NLEV (2001 model year) and Tier 2 (2004 model year) programs are included in the baseline estimates. This included the modest evaporative VOC reductions associated with the Tier 2 rule.

- The impact of the 2.5 g/bhp-hr NMHC+NOx emission standard for HDDVs was included for 2004 and later model year vehicles.

- The impacts of HDDV fuel economy strategies (i.e., "defeat device") on NOx emissions were included.

- Clark County registrations by vehicle age, MOBILE6 mileage accrual rates, and MOBILE6 VMT fractions by vehicle class were used in the analysis. Of particular importance to the inventory estimates is the use of MOBILE6 VMT fractions by vehicle class, which assume a substantial shift in VMT from cars to the higher emitting light-duty truck classes over time.

- Because vehicle activity is reported only in terms of VMT, an estimate of trip length was needed to convert vehicle start emissions (calculated as grams per trip) into a g/mi basis. This analysis used a value of 4.05 miles per trip to be consistent with MOBILE6 and the modeling performed for the Tier 2 study.

Tables 2-17 and 2-18 contain the detailed inventory estimates (by roadway type and speed) prepared for this study for summer and winter, respectively. Those tables show both the g/mi emission factors and the resulting inventory.

Table 2-17a. Las Vegas Metropolitan Area Baseline On-Road Motor Vehicle Summer Emissions Inventory (2000, 2005, 2010).

Las Vegas Metropolitan Area Baseline On-Road Motor Vehicle Summer Emissions Inventory (2000, 2005, 2010)

VMT From the Regional Transportation Plan
Calendar Year: 2000

Facility Type	Ave. Daily VMT	Modeled Roadway Type	Free Flow Speed	Emission Factors (g/mi) Total VOC	CO	NOx	Emission Inventory (U.S. tons/day) Total VOC	CO	NOx
Externals	757,641.9	F	65.0	1.612	21.658	2.537	1.35	18.09	2.12
Interstates	3,858,159.0	F	60.0	1.656	19.828	2.404	7.04	84.32	10.23
Expressways	269,358.3	F	55.0	1.713	18.287	2.303	0.51	5.43	0.68
Freeways	1,569,664.0	F	55.0	1.713	18.287	2.303	2.96	31.64	3.98
Major Arterials	3,480,546.0	F	45.0	1.878	16.061	2.163	7.21	61.62	8.30
Minor Arterials	7,284,595.0	F	35.0	2.106	14.606	2.081	16.91	117.28	16.71
System Ramps	96,606.7	R	35.0	2.355	30.324	2.642	0.25	3.23	0.28
Collectors	2,914,711.0	A	30.0	2.280	14.742	1.817	7.33	47.36	5.84
Ramps	274,806.6	R	25.0	2.616	30.324	2.642	0.79	9.19	0.80
Local	2,185,153.0	L	15.0	3.532	21.801	2.222	8.51	52.51	5.35
Public Transit Bus	66,900.0	HD	13.5	2.233	17.042	9.399	0.16	1.26	0.69
Intrazonal Trips	73,268.0	L	10.0	4.407	21.801	2.222	0.36	1.76	0.18
DAILY TOTALS	**22,831,409.5**						**53.37**	**433.69**	**55.17**

VMT Interpolated from the Regional Transportation Plan
Calendar Year: 2005

Facility Type	Ave. Daily VMT	Modeled Roadway Type	Free Flow Speed	Emission Factors (g/mi) Total VOC	CO	NOx	Emission Inventory (U.S. tons/day) Total VOC	CO	NOx
Externals	937,288.5	F	65.0	1.217	15.766	1.991	1.26	16.29	2.06
Interstates	4,557,407.5	F	60.0	1.250	14.377	1.881	6.28	72.22	9.45
Expressways	288,161.2	F	55.0	1.292	13.198	1.797	0.41	4.19	0.57
Freeways	2,155,247.0	F	55.0	1.292	13.198	1.797	3.07	31.35	4.27
Major Arterials	3,868,700.0	F	45.0	1.415	11.516	1.679	6.04	49.11	7.16
Minor Arterials	8,440,611.5	F	35.0	1.572	10.414	1.608	14.63	96.89	14.97
System Ramps	112,968.7	R	35.0	1.723	23.266	2.066	0.21	2.90	0.26
Collectors	3,686,895.0	A	30.0	1.692	10.474	1.482	6.87	42.57	6.02
Ramps	330,199.2	R	25.0	1.927	23.266	2.066	0.70	8.47	0.75
Local	2,491,133.5	L	15.0	2.559	15.685	1.813	7.03	43.07	4.98
Public Transit Bus	131,800.0	HD	13.5	1.439	16.839	7.067	0.21	2.45	1.03
Intrazonal Trips	78,938.5	L	10.0	3.211	15.685	1.813	0.28	1.36	0.16
DAILY TOTALS	**27,079,350.5**						**46.98**	**370.87**	**51.67**

VMT From the Regional Transportation Plan
Calendar Year: 2010

Facility Type	Ave. Daily VMT	Modeled Roadway Type	Free Flow Speed	Emission Factors (g/mi) Total VOC	CO	NOx	Emission Inventory (U.S. tons/day) Total VOC	CO	NOx
Externals	1,116,935.0	F	65.0	0.993	9.516	1.337	1.22	11.72	1.65
Interstates	5,256,656.0	F	60.0	1.031	8.696	1.257	5.97	50.39	7.29
Expressways	306,964.0	F	55.0	1.074	7.997	1.196	0.36	2.71	0.40
Freeways	2,740,830.0	F	55.0	1.074	7.997	1.196	3.25	24.16	3.61
Major Arterials	4,256,854.0	F	45.0	1.181	7.060	1.113	5.54	33.13	5.22
Minor Arterials	9,596,628.0	F	35.0	1.262	6.469	1.066	13.35	68.44	11.28
System Ramps	129,330.7	R	35.0	1.348	13.696	1.346	0.19	1.95	0.19
Collectors	4,459,079.0	A	30.0	1.368	6.538	1.010	6.72	32.14	4.96
Ramps	385,591.8	R	25.0	1.564	13.696	1.346	0.66	5.82	0.57
Local	2,797,114.0	L	15.0	2.076	9.731	1.218	6.40	30.00	3.76
Public Transit Bus	196,700.0	HD	13.5	1.104	16.770	4.751	0.24	3.64	1.03
Intrazonal Trips	84,609.0	L	10.0	2.398	9.731	1.218	0.22	0.91	0.11
DAILY TOTALS	**31,327,291.5**						**44.14**	**264.99**	**40.08**

Table 2-17b. Las Vegas Metropolitan Area Baseline On-Road Motor Vehicle Summer Emissions Inventory (2015, 2020, 2025).

Las Vegas Metropolitan Area Baseline On-Road Motor Vehicle Summer Emissions Inventory (2015, 2020, 2025)

VMT Interpolated from the Regional Transportation Plan
Calendar Year: 2015

Facility Type	Ave. Daily VMT	Modeled Roadway Type	Free Flow Speed	Emission Factors (g/mi) Total VOC	CO	NOx	Emission Inventory (U.S. tons/day) Total VOC	CO	NOx
Externals	1,239,257.0	F	65.0	0.784	7.732	1.007	1.07	10.56	1.38
Interstates	5,672,647.0	F	60.0	0.801	7.095	0.932	5.01	44.37	5.83
Expressways	331,605.8	F	55.0	0.824	6.551	0.877	0.30	2.39	0.32
Freeways	3,328,673.0	F	55.0	0.824	6.551	0.877	3.03	24.04	3.22
Major Arterials	4,844,466.5	F	45.0	0.897	5.844	0.805	4.79	31.21	4.30
Minor Arterials	10,703,839.0	F	35.0	0.988	5.405	0.768	11.66	63.77	9.06
System Ramps	131,406.1	R	35.0	1.050	10.825	0.954	0.15	1.57	0.14
Collectors	5,526,409.5	A	30.0	1.055	5.486	0.729	6.43	33.42	4.44
Ramps	427,637.3	R	25.0	1.180	10.825	0.954	0.56	5.10	0.45
Local	3,206,313.0	L	15.0	1.571	8.061	0.886	5.55	28.49	3.13
Public Transit Bus	197,050.0	HD	13.5	1.045	16.757	4.163	0.23	3.64	0.90
Intrazonal Trips	99,791.5	L	10.0	1.982	8.061	0.886	0.22	0.89	0.10
DAILY TOTALS	**35,709,095.6**						**38.99**	**249.45**	**33.27**

VMT From the Regional Transportation Plan
Calendar Year: 2020

Facility Type	Ave. Daily VMT	Modeled Roadway Type	Free Flow Speed	Emission Factors (g/mi) Total VOC	CO	NOx	Emission Inventory (U.S. tons/day) Total VOC	CO	NOx
Externals	1,361,579.0	F	65.0	0.703	6.967	0.841	1.05	10.46	1.26
Interstates	6,088,638.0	F	60.0	0.717	6.419	0.764	4.81	43.08	5.12
Expressways	356,247.5	F	55.0	0.738	5.948	0.707	0.29	2.34	0.28
Freeways	3,916,516.0	F	55.0	0.738	5.948	0.707	3.19	25.68	3.05
Major Arterials	5,432,079.0	F	45.0	0.803	5.350	0.635	4.81	32.03	3.80
Minor Arterials	11,811,050.0	F	35.0	0.886	4.974	0.601	11.53	64.76	7.83
System Ramps	133,481.4	R	35.0	0.938	9.625	0.749	0.14	1.42	0.11
Collectors	6,593,740.0	A	30.0	0.947	5.060	0.576	6.88	36.78	4.19
Ramps	469,682.8	R	25.0	1.057	9.625	0.749	0.55	4.98	0.39
Local	3,615,512.0	L	15.0	1.417	7.349	0.715	5.65	29.29	2.85
Public Transit Bus	197,400.0	HD	13.5	0.987	16.757	4.070	0.21	3.65	0.89
Intrazonal Trips	114,974.0	L	10.0	1.794	7.349	0.715	0.23	0.93	0.09
DAILY TOTALS	**40,090,899.7**						**39.34**	**255.39**	**29.86**

VMT Interpolated from the Regional Transportation Plan
Calendar Year: 2025

Facility Type	Ave. Daily VMT	Modeled Roadway Type	Free Flow Speed	Emission Factors (g/mi) Total VOC	CO	NOx	Emission Inventory (U.S. tons/day) Total VOC	CO	NOx
Externals	1,495,974.9	F	65.0	0.654	6.865	0.780	1.08	11.32	1.29
Interstates	6,535,134.8	F	60.0	0.667	6.341	0.696	4.81	45.68	5.01
Expressways	382,720.4	F	55.0	0.687	5.889	0.635	0.29	2.48	0.27
Freeways	4,608,172.0	F	55.0	0.687	5.889	0.635	3.49	29.91	3.22
Major Arterials	6,090,966.3	F	45.0	0.750	5.314	0.559	5.03	35.68	3.75
Minor Arterials	13,032,791.5	F	35.0	0.829	4.947	0.525	11.91	71.07	7.54
System Ramps	135,589.5	R	35.0	0.878	9.486	0.662	0.13	1.42	0.10
Collectors	7,867,206.9	A	30.0	0.888	5.034	0.513	7.70	43.65	4.45
Ramps	515,862.2	R	25.0	0.994	9.486	0.662	0.57	5.39	0.38
Local	4,076,934.2	L	15.0	1.339	7.254	0.651	6.02	32.60	2.93
Public Transit Bus	197,750.6	HD	13.5	0.929	16.756	4.095	0.20	3.65	0.89
Intrazonal Trips	132,466.4	L	10.0	1.704	7.254	0.651	0.25	1.06	0.10
DAILY TOTALS	**45,071,569.8**						**41.48**	**283.92**	**29.93**

Table 2-18a. Las Vegas Metropolitan Area Baseline On-Road Motor Vehicle Winter Emissions Inventory (2000, 2005, 2010).

Las Vegas Metropolitan Area Baseline On-Road Motor Vehicle Winter Emissions Inventory (2000, 2005, 2010)

VMT From the Regional Transportation Plan
Calendar Year: 2000

Facility Type	Ave. Daily VMT	Modeled Roadway Type	Free Flow Speed	Emission Factors (g/mi) Total VOC	CO	NOx	Emission Inventory (U.S. tons/day) Total VOC	CO	NOx
Externals	757,641.9	F	65.0	1.256	15.398	2.461	1.05	12.86	2.06
Interstates	3,858,159.0	F	60.0	1.277	14.811	2.330	5.43	62.99	9.91
Expressways	269,358.3	F	55.0	1.301	14.281	2.230	0.39	4.24	0.66
Freeways	1,569,664.0	F	55.0	1.301	14.281	2.230	2.25	24.71	3.86
Major Arterials	3,480,546.0	F	45.0	1.369	13.441	2.093	5.25	51.57	8.03
Minor Arterials	7,284,595.0	F	35.0	1.456	12.753	2.016	11.69	102.40	16.18
System Ramps	96,606.7	R	35.0	1.724	18.475	2.550	0.18	1.97	0.27
Collectors	2,914,711.0	A	30.0	1.543	12.845	1.749	4.96	41.27	5.62
Ramps	274,806.6	R	25.0	1.779	18.475	2.550	0.54	5.60	0.77
Local	2,185,153.0	L	15.0	2.075	15.879	2.136	5.00	38.25	5.14
Public Transit Bus	66,900.0	HD	13.5	2.233	17.042	9.399	0.16	1.26	0.69
Intrazonal Trips	73,268.0	L	10.0	2.262	15.879	2.136	0.18	1.28	0.17
DAILY TOTALS	**22,831,409.5**						**37.09**	**348.39**	**53.37**

VMT Interpolated from the Regional Transportation Plan
Calendar Year: 2005

Facility Type	Ave. Daily VMT	Modeled Roadway Type	Free Flow Speed	Emission Factors (g/mi) Total VOC	CO	NOx	Emission Inventory (U.S. tons/day) Total VOC	CO	NOx
Externals	937,288.5	F	65.0	0.934	13.081	1.912	0.96	13.52	1.98
Interstates	4,557,407.5	F	60.0	0.946	12.574	1.803	4.75	63.17	9.06
Expressways	288,161.2	F	55.0	0.961	12.107	1.720	0.31	3.85	0.55
Freeways	2,155,247.0	F	55.0	0.961	12.107	1.720	2.28	28.76	4.09
Major Arterials	3,868,700.0	F	45.0	1.005	11.346	1.605	4.29	48.39	6.84
Minor Arterials	8,440,611.5	F	35.0	1.063	10.696	1.537	9.89	99.52	14.30
System Ramps	112,968.7	R	35.0	1.232	16.683	1.971	0.15	2.08	0.25
Collectors	3,686,895.0	A	30.0	1.116	10.742	1.410	4.54	43.66	5.73
Ramps	330,199.2	R	25.0	1.277	16.683	1.971	0.46	6.07	0.72
Local	2,491,133.5	L	15.0	1.473	13.315	1.726	4.05	36.56	4.74
Public Transit Bus	131,800.0	HD	13.5	1.439	16.839	7.067	0.21	2.45	1.03
Intrazonal Trips	78,938.5	L	10.0	1.626	13.315	1.726	0.14	1.16	0.15
DAILY TOTALS	**27,079,350.5**						**32.03**	**349.17**	**49.42**

VMT From the Regional Transportation Plan
Calendar Year: 2010

Facility Type	Ave. Daily VMT	Modeled Roadway Type	Free Flow Speed	Emission Factors (g/mi) Total VOC	CO	NOx	Emission Inventory (U.S. tons/day) Total VOC	CO	NOx
Externals	1,116,935.0	F	65.0	0.726	9.678	1.289	0.89	11.91	1.59
Interstates	5,256,656.0	F	60.0	0.731	9.264	1.209	4.24	53.68	7.01
Expressways	306,964.0	F	55.0	0.740	8.881	1.149	0.25	3.01	0.39
Freeways	2,740,830.0	F	55.0	0.740	8.881	1.149	2.24	26.83	3.47
Major Arterials	4,256,854.0	F	45.0	0.770	8.280	1.067	3.61	38.85	5.01
Minor Arterials	9,596,628.0	F	35.0	0.810	7.775	1.022	8.57	82.25	10.81
System Ramps	129,330.7	R	35.0	0.910	12.530	1.289	0.13	1.79	0.18
Collectors	4,459,079.0	A	30.0	0.845	7.815	0.965	4.15	38.41	4.74
Ramps	385,591.8	R	25.0	0.950	12.530	1.289	0.40	5.33	0.55
Local	2,797,114.0	L	15.0	1.102	9.934	1.166	3.40	30.63	3.60
Public Transit Bus	196,700.0	HD	13.5	1.104	16.770	4.751	0.24	3.64	1.03
Intrazonal Trips	84,609.0	L	10.0	1.232	9.934	1.166	0.11	0.93	0.11
DAILY TOTALS	**31,327,291.5**						**28.24**	**297.25**	**38.48**

Table 2-18b. Las Vegas Metropolitan Area Baseline On-Road Motor Vehicle Winter Emissions Inventory (2015, 2020, 2025).

Las Vegas Metropolitan Area Baseline On-Road Motor Vehicle Winter Emissions Inventory (2015, 2020, 2025)

VMT Interpolated from the Regional Transportation Plan
Calendar Year: 2015

Facility Type	Ave. Daily VMT	Modeled Roadway Type	Free Flow Speed	Emission Factors (g/mi) Total VOC	CO	NOx	Emission Inventory (U.S. tons/day) Total VOC	CO	NOx
Externals	1,239,257.0	F	65.0	0.609	8.446	0.984	0.83	11.54	1.34
Interstates	5,672,647.0	F	60.0	0.613	8.065	0.910	3.83	50.43	5.69
Expressways	331,605.8	F	55.0	0.618	7.716	0.854	0.23	2.82	0.31
Freeways	3,328,673.0	F	55.0	0.618	7.716	0.854	2.27	28.31	3.13
Major Arterials	4,844,466.5	F	45.0	0.643	7.179	0.783	3.43	38.33	4.18
Minor Arterials	10,703,839.0	F	35.0	0.675	6.738	0.746	7.97	79.50	8.81
System Ramps	131,406.1	R	35.0	0.748	10.957	0.926	0.11	1.59	0.13
Collectors	5,526,409.5	A	30.0	0.703	6.785	0.707	4.28	41.33	4.31
Ramps	427,637.3	R	25.0	0.784	10.957	0.926	0.37	5.17	0.44
Local	3,206,313.0	L	15.0	0.921	8.751	0.861	3.25	30.93	3.04
Public Transit Bus	197,050.0	HD	13.5	1.045	16.757	4.163	0.23	3.64	0.90
Intrazonal Trips	99,791.5	L	10.0	1.039	8.751	0.861	0.11	0.96	0.09
DAILY TOTALS	**35,709,095.6**						**26.92**	**294.55**	**32.38**

VMT From the Regional Transportation Plan
Calendar Year: 2020

Facility Type	Ave. Daily VMT	Modeled Roadway Type	Free Flow Speed	Emission Factors (g/mi) Total VOC	CO	NOx	Emission Inventory (U.S. tons/day) Total VOC	CO	NOx
Externals	1,361,579.0	F	65.0	0.546	7.941	0.828	0.82	11.92	1.24
Interstates	6,088,638.0	F	60.0	0.549	7.572	0.750	3.68	50.82	5.04
Expressways	356,247.5	F	55.0	0.553	7.236	0.694	0.22	2.84	0.27
Freeways	3,916,516.0	F	55.0	0.553	7.236	0.694	2.39	31.24	3.00
Major Arterials	5,432,079.0	F	45.0	0.575	6.726	0.622	3.44	40.27	3.73
Minor Arterials	11,811,050.0	F	35.0	0.604	6.310	0.589	7.86	82.16	7.67
System Ramps	133,481.4	R	35.0	0.664	10.349	0.732	0.10	1.52	0.11
Collectors	6,593,740.0	A	30.0	0.628	6.361	0.563	4.57	46.23	4.09
Ramps	469,682.8	R	25.0	0.699	10.349	0.732	0.36	5.36	0.38
Local	3,615,512.0	L	15.0	0.829	8.275	0.700	3.30	32.98	2.79
Public Transit Bus	197,400.0	HD	13.5	0.987	16.757	4.070	0.21	3.65	0.89
Intrazonal Trips	114,974.0	L	10.0	0.942	8.275	0.700	0.12	1.05	0.09
DAILY TOTALS	**40,090,899.7**						**27.08**	**310.04**	**29.28**

VMT Interpolated from the Regional Transportation Plan
Calendar Year: 2025

Facility Type	Ave. Daily VMT	Modeled Roadway Type	Free Flow Speed	Emission Factors (g/mi) Total VOC	CO	NOx	Emission Inventory (U.S. tons/day) Total VOC	CO	NOx
Externals	1,495,974.9	F	65.0	0.498	7.951	0.771	0.82	13.11	1.27
Interstates	6,535,134.8	F	60.0	0.500	7.577	0.687	3.60	54.58	4.95
Expressways	382,720.4	F	55.0	0.504	7.236	0.626	0.21	3.05	0.26
Freeways	4,608,172.0	F	55.0	0.504	7.236	0.626	2.56	36.76	3.18
Major Arterials	6,090,966.3	F	45.0	0.525	6.721	0.550	3.53	45.13	3.70
Minor Arterials	13,032,791.5	F	35.0	0.553	6.302	0.517	7.95	90.53	7.42
System Ramps	135,589.5	R	35.0	0.610	10.416	0.650	0.09	1.56	0.10
Collectors	7,867,206.9	A	30.0	0.577	6.354	0.504	5.00	55.10	4.37
Ramps	515,862.2	R	25.0	0.644	10.416	0.650	0.37	5.92	0.37
Local	4,076,934.2	L	15.0	0.770	8.294	0.640	3.46	37.27	2.88
Public Transit Bus	197,750.6	HD	13.5	0.929	16.756	4.095	0.20	3.65	0.89
Intrazonal Trips	132,466.4	L	10.0	0.882	8.294	0.640	0.13	1.21	0.09
DAILY TOTALS	**45,071,569.8**						**27.92**	**347.88**	**29.48**

Summary

While the MOBILE5b and PART5 models are the latest official versions of EPA's approved models for estimating emissions from on-road mobile sources, it is clear that future versions of the models which incorporate more recent data (e.g. MOBILE6 and PART6) will generate significantly different estimates. This is important for a number of reasons, the most significant of which may be that the newer versions of the models indicate that future year mobile source emission levels in the Las Vegas Valley will be lower than was previously forecast using the older model versions. The updated models also result in changes in the relative contributions of older and newer vehicles to total on-road emissions as well as the relative contributions of gasoline- and Diesel-powered vehicles. Given this, it is clear that the latest versions of EPA's MOBILE and PART series of models should be used to assess the need for and scope of potential additional control measures for on-road mobile sources. To the extent that updated models are not available, this assessment should be conducted using both the existing official version of the model and as was done here using versions of the models that have been modified using the best available new information regarding on-road mobile source emissions.

EMISSIONS INVENTORY FOR NONROAD MOBILE SOURCES

The nonroad mobile source category include a diverse collection of vehicles and equipment types in the following subcategories:

- airport ground support, such as baggage tugs;
- agricultural equipment, such as tractors, combines, and balers;
- construction equipment, such as tractors and back hoes;
- industrial and commercial equipment, such as forklifts and mobile generators;
- recreational vehicles, such as all-terrain vehicles and off-road motorcycles;
- residential and commercial lawn and garden equipment, such as lawnmowers and leaf blowers;
- logging equipment, such as skidders and large chain saws;
- recreational marine vessels, such as power boats;
- underground mining equipment;
- oil field equipment;
- aircraft;
- locomotives, and
- commercial marine vessels.

The nonroad source category includes more than 80 basic and 260 specific types of equipment, which are further delineated by engine horsepower ratings and fuel type. Emissions of concern from nonroad mobile sources are the same as for on-road mobile sources, e.g. direct emissions of CO and PM_{10} as well as VOC and NOx emissions which are precursors to ozone formation. However, unlike on-road mobile sources, exhaust emissions from nonroad equipment have not in general been included in previous emission inventories developed for the Las Vegas Valley, with the one notable exception being the emissions inventory generated for the 1995 CO SIP.

At present, the U.S. EPA is developing a new model, similar to the MOBILE and PART series of models discussed above, for estimating emissions from nonroad mobile sources. This model, called NONROAD is available in draft form. However, the model still requires additional development work in several areas and has not yet been finalized. As a result and as discussed in detail below, the nonroad mobile source inventory for this study was developed using a methodology that was generally based on the 1991 EPA NEVES study complemented by the NONROAD model.

The nonroad emission inventories for VOC, CO, NOx, and PM_{10} are shown in Figures 2-28 to 2-31, respectively. Summer and winter emissions are presented in figures a and b for each of these four figures as a function of equipment type. As discussed previously, these baseline inventories reflect the impact of federal, state and local control measures that are either already in place and those that are certain to be implemented. It does not, however, reflect additional control measures which could be implemented. Again, these are discussed in a separate report.

As shown, in Figures 2-28a and 2-28b, VOC emissions from nonroad mobile sources are somewhat more than twice as great during the summer months than during the winter. During the summer VOC emissions are dominated by lawn and garden and recreational equipment. During the winter VOC emissions are reduced relative to summer due to decreased outdoor activities and aircraft and recreational equipment emissions dominate the off-road VOC inventory. For both summer and winter months, VOC emissions are projected to decrease from 2000 to 2010 due to federal emission standards on new engines and undergo relatively modest increases through 2025 due to population growth in the Las Vegas Valley. By 2025 emissions are VOC projected to be at about 2000 levels. Similar results and trends are expected for CO emissions as shown in Figures 2-29a and 2-29b, with the main exception being that the impact of growth in the Las Vegas Valley causes the trend line for CO emissions from nonroad sources to turn back up following 2005.

In contrast to the VOC and CO inventories, the summer and winter NOx inventories for off-road equipment show in Figures 2-30a and 2-30b are dominated by the construction, aircraft, and locomotive categories with the former being by far the most significant source. NOx emissions from nonroad sources are higher during the summer than the winter due to greater source activity and the trend line decreases through 2015 due to federal standards for new construction equipment and locomotive engines. After 2015 NOx emissions will increase somewhat as the result of projected growth of the Las Vegas Valley.

Exhaust PM_{10} emissions from nonroad sources as show in Figures 2-31a and 2-31b are expected to increase over time from 2000 to 2025 and dominated by the construction equipment category.

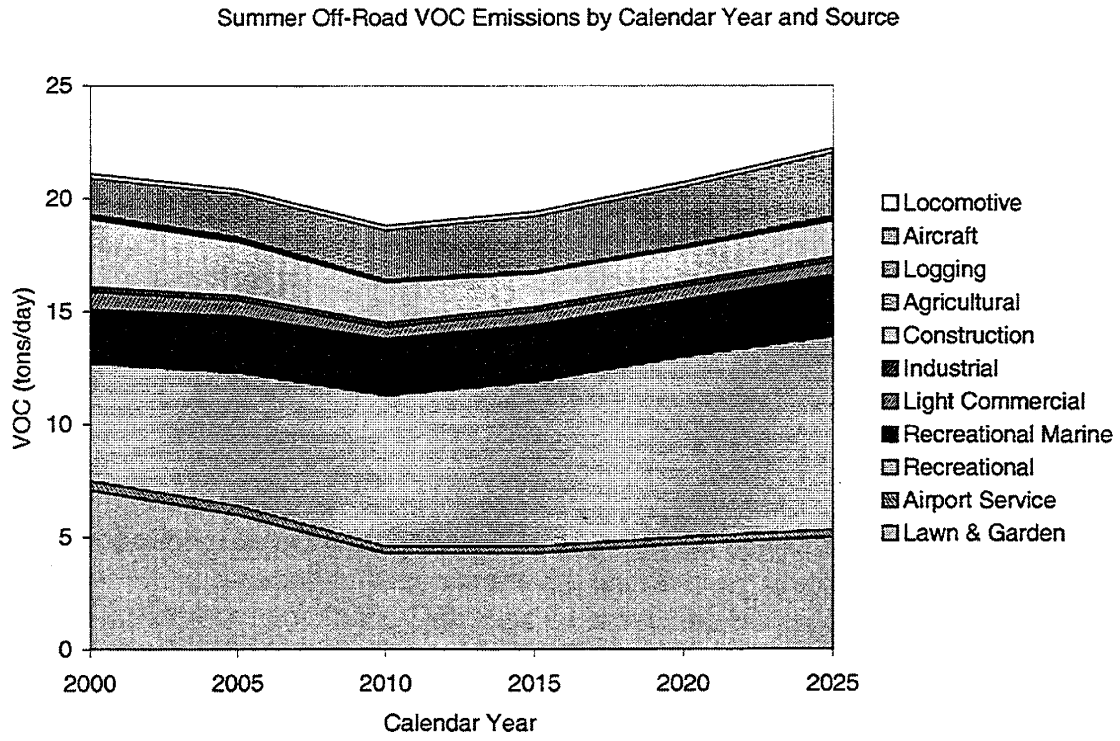


Figure 2-28a. Summer off-road VOC emissions by calendar year and source.

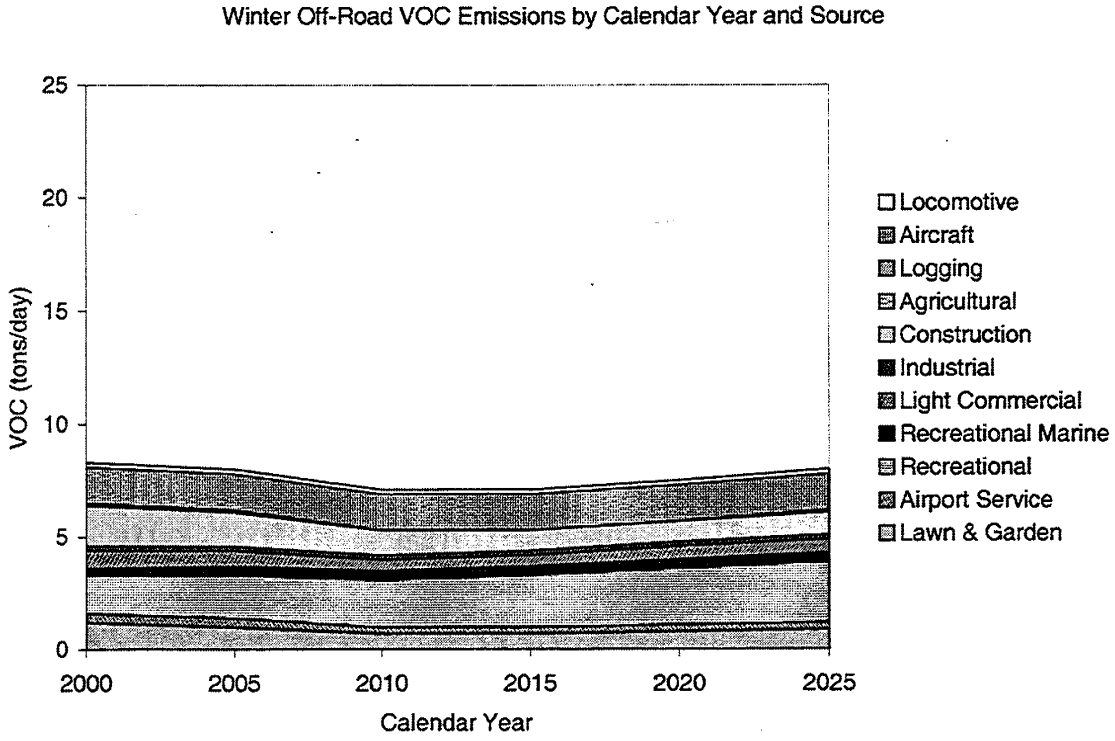


Figure 2-28b. Winter off-road VOC emissions by calendar year and source.

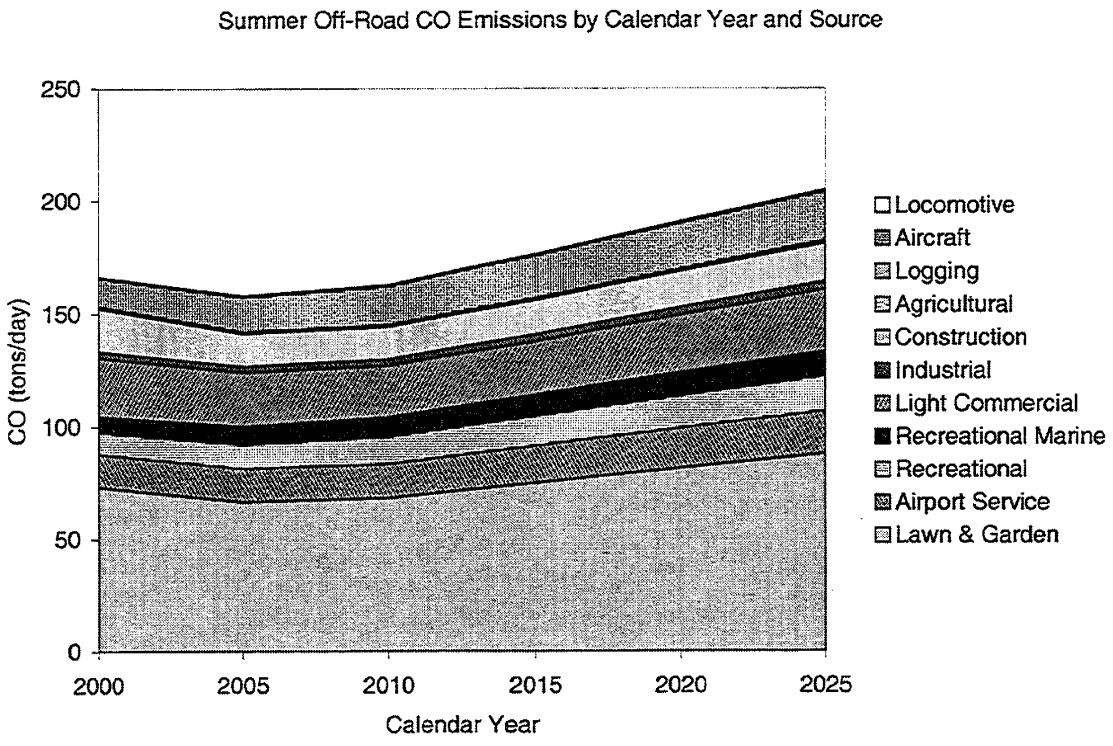


Figure 2-29a. Summer off-road CO emissions by calendar year and source.

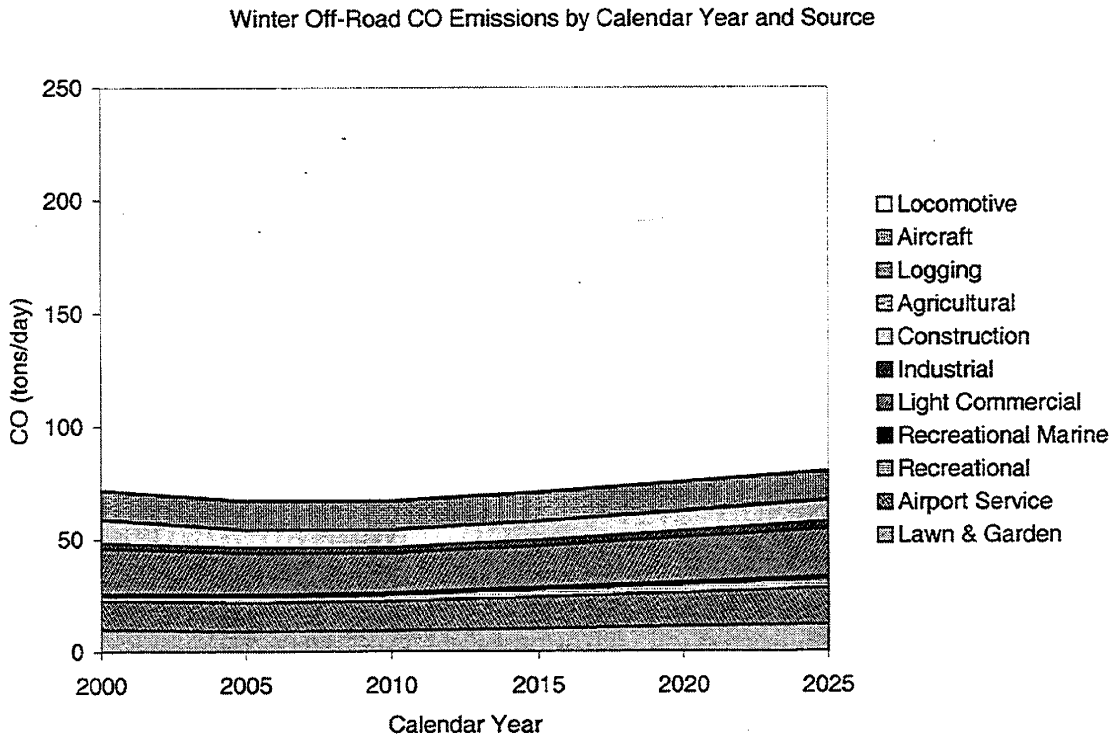


Figure 2-29b. Winter off-road CO emissions by calendar year and source.

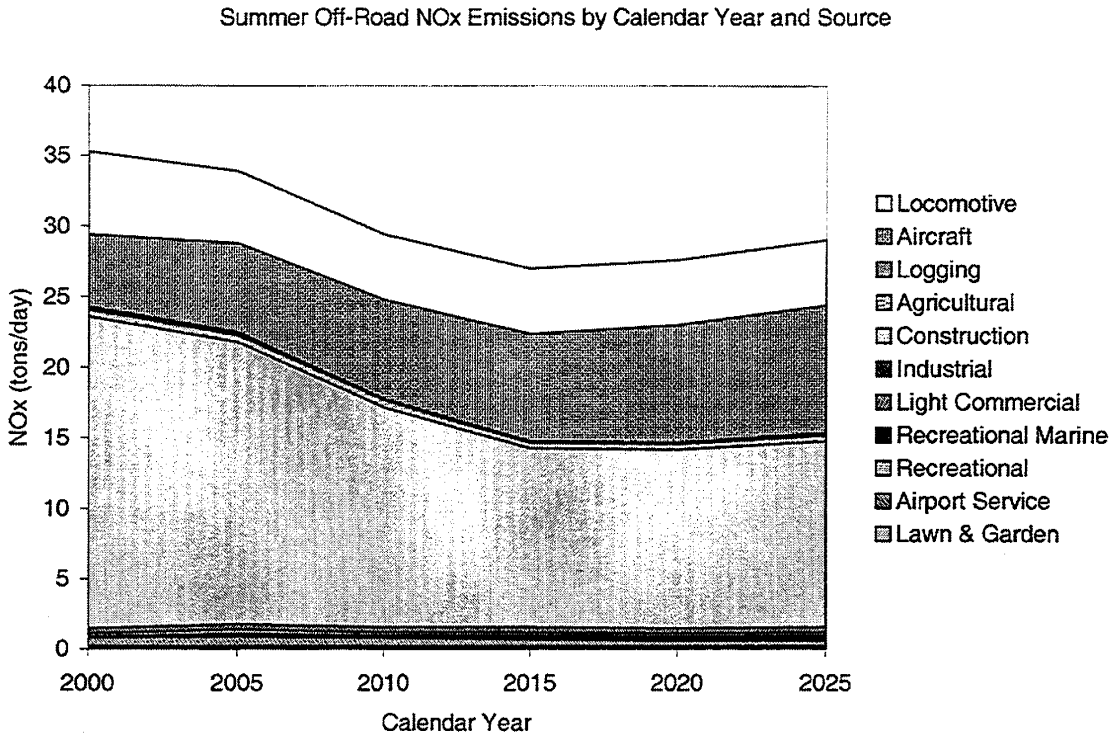


Figure 2-30a. Summer off-road NOx emissions by calendar year and source.

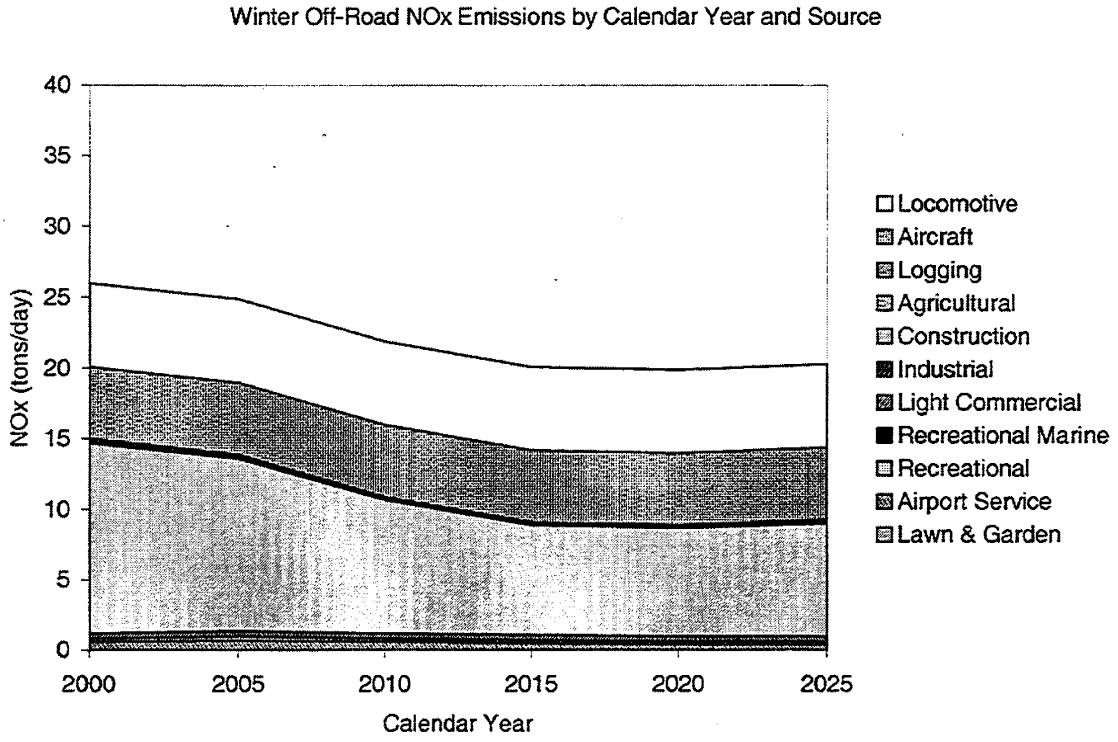


Figure 2-30b. Winter off-road NOx emissions by calendar year and source.

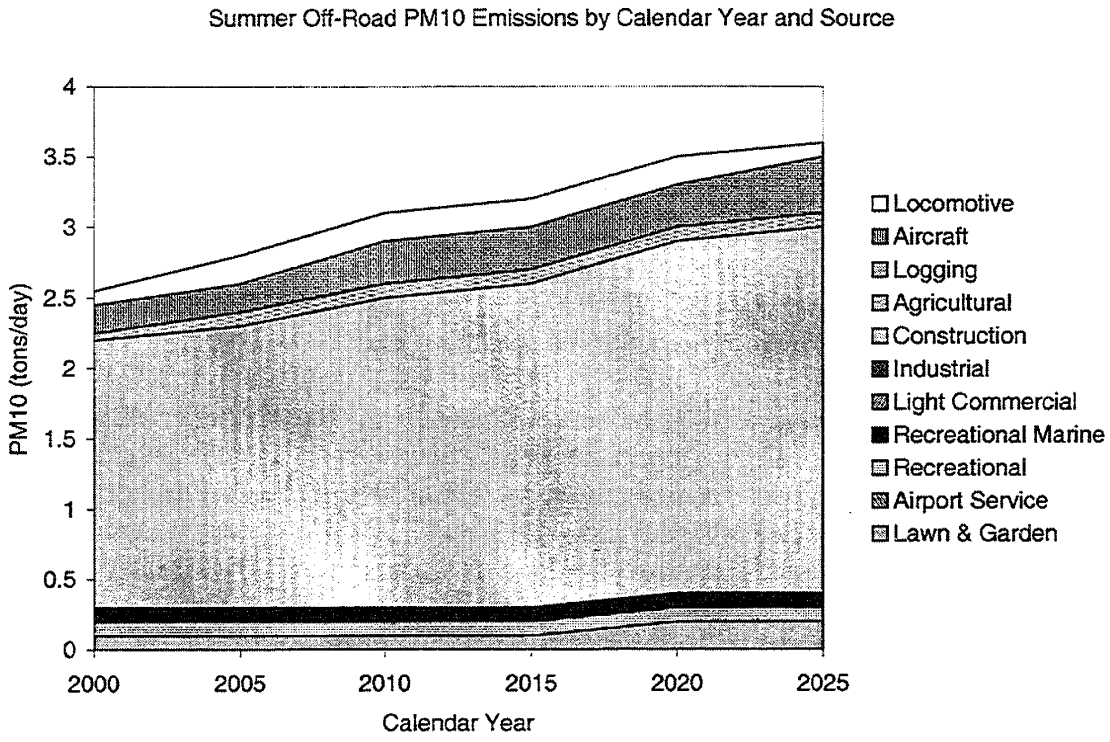


Figure 2-31a. Summer off-road PM_{10} emissions by calendar year and source.

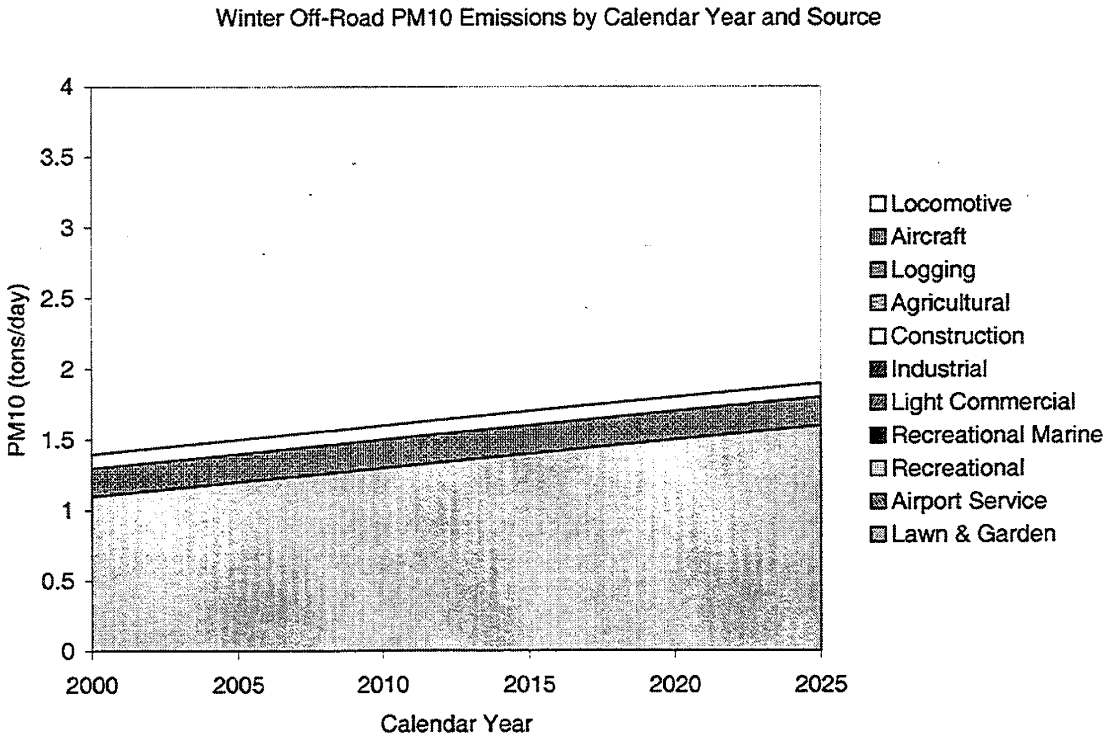


Figure 2-31b. Winter off-road PM_{10} emissions by calendar year and source.

METHODS FOR BASE YEAR (2000) INVENTORY PREPARATION

Historic nonroad emission inventories were taken from the EPA Nonroad Engine and Vehicle Emissions study (EPA, 1991) and applied to the Las Vegas area with human population as the activity indicator for nonroad equipment allocation (Cous, 2000; CCDCP, 1995). The area of interest for Las Vegas was considered to be a subcounty region of Clark County. So, some fraction of the Clark Co. human population was used to apportion the national emissions inventory. Although the Bureau of Economic Analysis (BEA, 1998) indicates that the Las Vegas Metropolitan Statistical Area (MSA) includes Clark and Nye counties in Nevada and Mojave Co. in Arizona, for this study ENVIRON agreed that Clark County should be the area of interest needed to determine the appropriate modeling area.

Several categories of nonroad equipment were not used to any great extent within Clark County; these are agricultural, logging, commercial marine, and various snow equipment. The light commercial and industrial equipment categories were not included in the SIP inventory though these are likely used within Las Vegas. Light commercial and industrial equipment includes applications like mobile generators, compressors, forklifts, sweepers, and other like equipment, which are generally considered to be used everywhere. Recreational marine are used at Lake Mead within Clark Co., but apparently not within the subcounty region of interest. Recreational marine may be a significant emission source, so its inclusion should be considered.

The EPA (1991, NEVES) estimates were derived for national equipment activity. Local areas were then determined by allocating the national equipment inventory through the use of surrogates for equipment activity. EPA (2000) has revised both the national population estimates and also the allocation surrogates in the draft NONROAD model though these estimates remain in draft form.

Estimates for three categories were taken from other sources. Aircraft and airport ground service equipment were taken from Ricondo (2000) for NOx and PM_{10} emissions levels, and from Leigh Fisher (1998) for VOC and CO. Locomotive emission estimates were derived from the 1995 Nevada State Implementation Plan (CCDCP, 1995).

NEVES (EPA, 1991)

The national nonroad inventory supplied by EPA (1991) is shown in Table 2-19 as the average of Inventory A and Inventory B, which were, respectively, the range of estimates derived by EPA and including manufacturers' data. This represents the current official EPA guidance for nonroad equipment emissions estimates. In order to use these estimates for a local area, a geographic allocation is needed.

Table 2-19. NEVES National Nonroad Emission Inventory (tons/year) for 1990.

Category	VOC	CO	NOx	PM
Lawn & Garden	806,651	6,019,434	11,161	12,584
Airport Service	17,046	151,433	104,233	9,611
Recreational	711,432	1,263,955	5,057	13,168
Recreational Marine	1,198,426	3,500,679	67,149	56,136
Light Commercial	165,960	3,694,644	30,233	3,963
Industrial	93,767	1,335,538	203,416	12,936
Construction	143,866	860,279	954,585	97,102
Agricultural	208,981	990,874	936,133	138,720
Logging	23,606	135,414	70,291	8,228
Commercial Marine	543,464	1,822,527	218,799	16,204
Total Nonroad (excluding Locomotive)	3,913,198	19,774,775	2,601,056	368,649
Total Nonroad (Las Vegas CO SIP Categories)	1,678,995	8,295,100	1,075,036	132,464

The Las Vegas CO SIP (CCDCP, 1995) states that the nonroad (excluding locomotives) CO inventory was 11,342.5 tons per year, so the apparent geographic allocation multiplier was 0.00137 from national to Las Vegas nonattainment area. The national human population in 1990 was 249,439,545; applying the fraction calculated above indicated that the sub-county human population used was 341,732. This is a fraction of the 1990 Clark Co. population of 754,573 and the Las Vegas MSA population of 867,806. Including all of the Clark Co. population would show a 1990 emission inventory for CO of 25,093 compared with the 11,342.5 tons per year in the SIP. Including the other categories, (recreational marine, commercial, industrial), the Clark Co. total population would have produced a CO emission inventory of 50,900 or a significantly higher estimate.

Therefore, a revised NEVES-based Clark county emission inventory estimate was determined by applying the geographic allocations shown in Table 2-20 to the national emission inventory; the results are shown in Table 2-21. EPA has revised the geographic allocation for its draft NONROAD model, though in many cases they are the same allocation indicators with a different base year. As a last resort, human population could be used as a geographic allocation indicator; the inventory using this indicator is shown in Table 2-22.

Table 2-20. NEVES and NONROAD geographic allocation (National to county) for 1990.

Category	NEVES Description Method	NEVES Estimate (Clark Co.)	NONROAD Description
Lawn & Garden (residential)	Number of single and double family housing (NSFH).	-	Number of single and double family housing
Lawn & Garden (commercial)	Number of employees in landscape and horticulture (EM78) (SIC-78)	-	Number of employees in landscape and horticulture (SIC-78)
Lawn & Garden Combined	1.2054 (NSFH) + 173.44 (EM78)	0.00276	-
Airport Service	Air Carrier Operations from FAA Air Traffic Activity Report	0.01664	Number of employees in air transportation (SIC-4500).
Recreational (except Golf Carts)	Motorcycle Dealers Establishments (SIC-557)	0.00202	Number of camps and recreational vehicle park establishments (SIC-7030).
Recreational (Golf Carts)	-	-	Number of public golf courses (SIC-7992).
Recreational Marine	Water surface area (including 1 mile x shoreline)	0.00075	Water surface area to national water surface area.
Light Commercial	Number of wholesale establishments	0.00199	Number of wholesale establishments (SIC-50).
Industrial	Number of manufacturing employees (SIC-20)	0.00059	Number of employees in manufacturing (SIC-20)
Construction	Number of construction employees	0.00558	FW Dodge total dollar value of construction by county.
Agricultural	Number of Agricultural service employees minus Landscape and Horticultural (SIC-07 - SIC-078)	0.00013	Harvested cropland (U.S. Census Bureau, USA Counties database).
Logging	Number of Lumber and Wood Products (except furniture) Employees (SIC-241)	0.00103	Number of employees in logging only (SIC-241).
Human Population	-	0.00303	-

Table 2-21. Clark County nonroad emission inventory (tons/year) for 1990 using NEVES (EPA, 1991) and NEVES geographic allocation surrogates.

Category	VOC	CO	NOx	PM
Lawn & Garden	2,226	16,614	31	35
Airport Service	283	2,514	1,730	160
Recreational	1,437	2,553	10	27
Recreational Marine	899	2,626	50	42
Light Commercial	330	7,352	60	8
Industrial	55	788	120	8
Construction	803	4,800	5,327	542
Agricultural	27	129	122	18
Logging	24	139	72	8
Total (excluding locomotive)	5,854	35,459	6,108	716

Table 2-22. Clark County nonroad emission inventory (tons/year) for 1990 using NEVES and a human population surrogate for geographic allocation.

Category	VOC	CO	NOx	PM
Lawn & Garden	2,440	18,209	34	38
Airport Service	52	458	315	29
Recreational	2,152	3824	15	40
Recreational Marine	3,625	10,590	203	170
Light Commercial	502	11,177	91	12
Industrial	284	4,040	615	39
Construction	435	2,602	2,888	294
Agricultural	0	0	0	0
Logging	0	0	0	0
Total (excluding locomotive)	9,490	50,900	4,162	622

From the tables above, the choice of allocation indicator can have an effect on the overall emissions predicted for a given county. The NEVES methodology includes specific estimates based on the indicators expected to closely simulate the equipment activity. For that reason the NEVES approach includes a small amount of activity for agriculture and logging. With the human population allocation method, agriculture and logging activity were both zeroed because human population is not a good indicator of this activity and the previous CO SIP (CCDCP, 1995) had also considered this activity to be insignificant.

Overall, human population is not considered a reasonable indicator for all activity types, so the NEVES methodology will be used for the base year estimates. Human population allocation ignores activity differences by category, making the regional estimates suspect. Also, for most categories, the NEVES methodology is expected to be used in future EPA guidance.

Draft NONROAD

EPA's draft NONROAD model (EPA, 2000) has been released for review by stakeholders, and it is intended to replace the NEVES estimates and guidance for future modeling. As shown in Table 2-23, the model estimates considerably higher emissions than the NEVES methodology, in large part because of the allocation indicators used, especially for construction equipment.

Table 2-23. Draft NONROAD Clark County nonroad emission inventory (tons/year) for 1990 (% exhaust VOC).

Category	VOC	CO	NOx	PM
Lawn & Garden	4,566	52,673	627	147
Airport Service	9	61	33	5
Recreational	475	9,212	53	6
Recreational Marine	771	1,602	43	23
Light Commercial	497	8,150	294	35
Industrial	88	995	473	70
Construction	3,615	20,914	17,617	2,358
Agricultural	3	12	17	1
Logging	0	0	0	0
Railroad Maintenance	4	32	13	2
Total (excluding locomotive)	10,026	93,652	19,169	2,648

The draft NONROAD model, which is not final and may change significantly before its official use, uses some different methods to allocate the national equipment population than human population for all categories as detailed in Table 2-23.

Construction equipment emissions are estimated to be much more significant in the NONROAD estimates for Clark Co. than using the NEVES methodology and inventory. Construction emissions were calculated by allocating national equipment population totals to Clark Co. using relative construction dollars. The data source for the construction dollar value, F.W. Dodge, apportions the full contract or permit valuation into the year of initial construction, and for NONROAD the year of interest for construction valuation is 1996. So if this year had an extraordinary number of expensive projects initiated, construction equipment usage may be overestimated. Also, construction dollars are heavily weighted to residential and light commercial building construction, though heavy excavation, road building, mining, and landfill activity provide the bulk of the construction equipment activity (ENVIRON, 1999). Therefore, the draft NONROAD may overallocate construction equipment activity to areas associated with residential housing and therefore urban areas. However, the final release of NONROAD will have a revised construction allocation method when taken into account the relative amount of construction activity by type of construction project.

Emission Benefits

The NONROAD model is the only tool available to estimate emission benefits of Federal rulemaking for lower emitting nonroad engines. In order to determine the emission benefits, the NONROAD model was run with a zero growth scenario from in-use year 1990 and 2000.

The result of these runs allows a determination of the fractional emissions reductions due to fleet turnover only. These are shown for the application segments and combine the effects of gasoline and diesel engine emission reductions.

Table 2-24. Draft NONROAD emission reduction estimates (%) from 1990 to 2000.

Category	VOC	CO	NOx	PM
Lawn & Garden	- 34	- 9	+ 10	- 12
Airport Service	- 32	- 12	- 32	- 36
Recreational	- 4	- 1	+ 8	- 9
Recreational Marine	- 1	0	+ 1	- 1
Light Commercial	- 34	- 7	+ 4	- 15
Industrial	- 14	- 8	- 11	- 12
Construction	- 27	- 21	- 18	- 23
Agricultural	- 35	- 11	- 18	- 36
Logging	----	----	----	----
Railroad Maintenance	- 30	- 10	- 18	- 32

Airport Emissions

More careful treatment of aircraft and ground support equipment (GSE) was conducted for Clark Co. airports as compared with the current information available from EPA (Ricondo, 2000; Leigh Fisher, 1998). The base year in this report for the activity and emissions estimations was 1998 for Ricondo and 1997 for Leigh Fisher.

Aircraft Emissions

Aircraft emissions determine the emissions per landing and takeoff (LTO), and by aircraft type. Ricondo (2000) estimated that NOx and PM_{10} emissions in 1998 were reported as 1,795 and 70 tons per year, respectively, but no values for VOC and CO. For comparison, Leigh Fisher reported 1,928 and 0 tons, respectively, so the Ricondo values were considered more appropriate for the pollutants that they estimated. The Leigh Fisher estimates for HC and CO were 540 and 4,226 tons per year and seem more appropriate than those in the 1995 CO SIP described below.

The CO SIP (CCDCP, 1995) estimated that 14,326 tons per year of CO came from aircraft. EPA (1999a) recently contracted a review of emissions from 10 cities and concluded that CO and NOx emissions are expected to roughly equivalent, yet the CO SIP emission inventory was 8 times higher than the Ricondo NOx inventory. Only in part can this be explained by the relatively numerous small propeller and turbo-propeller powered aircraft, which have higher HC and CO emission levels and are found in Clark county.

At this time, it was out of the scope of this work to review the emission estimates for CO and HC using the official guidance. The work of Leigh Fisher is considered to be the most accurate assessment at this time for HC and CO emissions, and Ricondo for NOx and PM.

Ground Support Equipment

The Ricondo (2000) and Leigh Fisher (1998) reports detailed the equipment inventory for McCarran Airport and usage per landing and takeoff (LTO), but no information about rated power or annual usage of the equipment was given. So it was not possible to determine the overall activity of the GSE in order to update emission estimates with revised emission factors. Again Ricondo did not estimate HC and CO, so Leigh Fisher estimates were used for those pollutants.

Ricondo (2000, found in Table 21) estimated NOx and PM_{10} emissions to be 242.7 and 4.1 tons per year for 1998; Leigh Fisher estimated VOC and CO emissions from GSE to be 156 and 5,520 tons per year for 1997. Leigh Fisher estimated comparable but slightly lower numbers for NOx and PM to those of Ricondo.

This reports state that AP-42 emission factors were applied to the estimated equipment usage. EPA used NEVES (EPA, 1991) emission factor estimates in the AP-42 documentation; however, EPA has updated these emission factors including expected emission reductions from federal rulemakings. These emission factors depend upon the rated power of the engines, fuel type, model year, and typical use (transient or steady state).

In order to project this estimate to the year 2000, the 1998 inventory is multiplied by a growth factor and by an estimated emission reduction from new lower emitting engines. The growth estimate of 1.04 for 1998 and 1.06 for 1997 was derived from the overall population estimates. The emission reductions calculated by the draft NONROAD model are -6 and -5% for NOx and PM_{10} for 1998, and -13 and -7% for VOC and CO for 1997.

Locomotive

Historic estimates for locomotive emissions have used freight and passenger rail service activity supplied by Union Pacific and Amtrak railways.

Union Pacific runs a freight line from the Salt Lake area to Los Angeles through Clark Co., and the operational map shows at least 2 spur lines within Clark Co., but outside the metropolitan Las Vegas area.

Amtrak no longer runs trains through Clark Co.; the area is served through the use of highway inter-city buses. Locomotive service may be revived from Los Angeles to Los Vegas later in 2000. In the meantime, the passenger line emissions have been removed from the inventory.

Activity

Union Pacific is the primary rail line within Clark Co. and operates over 100 miles of rail lines there. As an update on the 1995 CO SIP, Union Pacific have been contacted to determine the total tonnage and track distance within Clark Co., but the revised figures are being prepared. In the meantime, the 1995 inventory for the CO nonattainment area was modified to include all track miles within Clark Co. using 125 miles (the length of Interstate 15) instead of the 41 miles listed in the 1995 CO SIP for the Las Vegas metropolitan area. In addition, Union Pacific (Union Pacific, 2000) operates at least 2 spur lines within Clark Co.,

presumably to service mining operations, however, presumably much less tonnage travels these lines, so at present they are not included in this analysis.

In the 1995 Clark Co. carbon monoxide SIP, the gross ton-miles (GTM) for line-haul operations within the 41 miles of the Las Vegas nonattainment area was estimated to be 1,380,470,000. Adding in the other mileage for the entire Clark Co. raises this total to 4,208,750,000 GTM. The gallons of fuel consumed by line-haul engines were then determined using the previous figure of 704 GTM per gallon to be 5,978,338 gallons per year. The switching operations (182,500 gallons per year) were also scaled by the track miles of the county divided by those of the nonattainment areas (3.05) to handle other switching operations within Clark Co. including operations on the spur tracks yields 556,402 gallons per year.

Emission Factors

EPA also reviewed and measured the emission factors on locomotive engines in the preparation of the new rulemaking (EPA, 1997a). The emission factors shown in Tables 2-25 and 6-8 were developed with the new average load factors described above. The emission factors were estimated for three different types of locomotive operation: line-haul, switching, and passenger. The emission factors for each type of locomotive depends on both the age distribution and typical load factors on each. Typically switching engines are older locomotives and operate at lower loads than the line-haul engines. The emission factors for line-haul and switching (yard) engines for both the revised EPA and official EPA estimates are shown in Table 2-25. Passenger locomotives no longer operate in Clark Co., so are not included in Table 2-25.

Table 2-25. EPA baseline emission factors (g/hp-hr) for locomotive engines.

Type	HC	CO	NOx	PM
Line-Haul (EPA, 1997)	~ 0.022 (lb/gal) 0.48	~0.059 (lb/gal) 1.28	~0.598 (lb/gal) 13.0	~0.015 (lb/gal) 0.32
Line-Haul (EPA, 1992)	0.021 (lb/gal) ~0.46	0.063 (lb/gal) ~1.37	0.493 (lb/gal) ~10.7	0.012 (lb/gal) ~0.26
Switching (EPA, 1997)	~0.046 (lb/gal) 1.01	~0.084 (lb/gal) 1.83	~0.801 (lb/gal) 17.4	~0.020 (lb/gal) 0.44
Switching (EPA, 1992)	0.051 (lb/gal) ~1.11	0.089 (lb/gal) ~1.93	0.504 (lb/gal) ~10.9	0.014 (lb/gal) ~0.30

Conversion approximations from lb/gallon to g/hp-hr use an average fuel consumption of 0.34 lb/hp-hr and 7.1 lb/gallon.

The emission inventory was modified to reflect the EPA (1997a) emission factors. This was necessary to put the emission inventory on the same basis as the calculated emission reductions for the new EPA rulemaking for locomotive engines. The change in the base inventory using the updated emission factors is significant for NOx and PM only.

1995 Base Year Emissions

Applying the EPA (1997a) emission factors to the estimated fuel usage described above yields the locomotive emission inventory shown in Table 2-26.

Table 2-26. Baseline emission estimates (tons/year) for locomotive engines in 1995.

Type	HC	CO	NOx	PM
Line-Haul	65.8	176.4	1,787.5	44.8
Switching	12.8	23.4	222.8	5.6

Conversion approximations from lb/gallon to g/hp-hr use an average fuel consumption of 0.34 lb/hp-hr and 7.1 lb/gallon.

The emissions benefits shown in Tables 2-27 and 2-28 were taken from the EPA rule support documents on Class I line-haul and switching locomotives. The Class I switch engine reductions are expected to be somewhat less because these engines are primarily older engines not benefiting from the more stringent new engine emission standards because the normal turnover is expected to be slower.

Table 2-27. Expected emission reductions (%) from Class I Line-haul locomotive as a result of the Federal locomotive rulemaking and normal turnover.

Year	HC	CO	NOx	PM
1999	0	0	0	0
2000	0	0	1	0
2005	4	0	32	4
2010	18	0	46	19
2015	24	0	50	25
2020	30	0	53	32
2025	35	0	56	38

Table 2-28. Expected emission reductions (%) from Class I Switching Locomotive as a result of the Federal locomotive rulemaking and normal turnover.

Year	HC	CO	NOx	PM
1999	0	0	0	0
2000	0	0	0	0
2005	1	0	7	1
2010	4	0	17	4
2015	7	0	27	8
2020	11	0	33	13
2025	16	0	38	18

Summary of the 2000 Base Year NONROAD Emission Inventory Estimates

The base year 2000 estimates were completed with two different methods labeled as a NEVES estimate and a NONROAD estimate. In each case, a growth factor and an emission reduction

associated with emission regulations and normal turnover of engines was applied to the base year emission estimates.

The NEVES estimate takes the 1990 estimates determined through the standard methods (with GSE taken from other sources), grown to a year 2000 estimate with the overall population, with emissions reductions applied as associated with fleet turnover determined from the NONROAD model. The results are shown in Table 2-29. No emission reduction was assumed for aircraft regulations, and the locomotive benefits already described were applied though very little benefit is projected for the year 2000. The annual pollution estimates include the use of lower sulfur (~400 ppm) diesel fuel and (~70 ppm) gasoline fuel in nonroad engines in Clark County. The emission reductions associated with the winter oxygenated (3.5 wt. % oxygen) gasoline were applied only to the daily winter totals and not the annual estimates.

Table 2-29. Clark County nonroad emission inventory (tons/year) for 2000 based on NEVES estimates.

Category	VOC	CO	NOx	PM
Lawn & Garden	1,763	18,142	41	28
Airport Service*	144	5,442	237	4
Recreational	1,655	3,033	13	29
Recreational Marine	1,068	3,151	61	50
Light Commercial	261	8,205	75	6
Industrial	57	870	128	5
Construction	703	4,550	5,242	441
Agricultural	21	138	120	11
Logging	23	123	65	6
Aircraft*	578	4,522	1,867	73
Locomotive**	79	200	2,169	50
Total	6,272	43,379	10,017	702

* Ricondo (2000) and Leigh Fisher (1998)
** Converted from 1995 Nevada CO SIP Estimates

The second method uses the draft NONROAD model with the default geographic allocations, normal fleet turnover, and incorporates an EGAS growth factor to convert 1996 base year estimates to an in-use 2000 base year estimates. Aircraft, airport service, and locomotive were taken from other estimates already described above. Emissions estimates for this method are provided in Table 2-30.

Table 2-30. Clark County nonroad emission inventory (tons/year) for 2000 based on NONROAD estimates and EGAS growth estimates for all except; airport service and locomotive categories.

Category	VOC	CO	NOx	PM
Lawn & Garden	3,938	60,914	1,127	160
Airport Service*	144	5,442	237	4
Recreational	438	8,177	49	5
Recreational Marine	602	847	22	12
Light Commercial	515	11,023	551	41
Industrial	97	1,166	643	56
Construction	4,214	23,930	24,358	2,696
Agricultural	2	13	19	1
Logging	602	847	22	12
Aircraft*	578	4,522	1,867	73
Locomotive**	79	200	2,169	50
Total	11,209	117,081	31,064	3,110

* Ricondo (2000) and Leigh Fisher (1998)
** Converted from 1995 Nevada CO SIP Estimates

The NEVES-derived numbers in Table 2-29 are considered the most appropriate for a number of reasons. The NEVES numbers are still considered to be the official EPA guidance because there has been no revision to EPA (1992). Also, the NONROAD model estimates are expected to change before the final release, particularly the construction numbers. The current NONROAD estimates for Clark County are dominated by the construction inventory and seem suspect in that they are so much higher than other categories. The NONROAD model was used to determine emission reduction fractions to apply to the base inventory grown into future years because no other tool exists.

Regardless of the region of interest, the tables demonstrate the categories of most interest depend upon the pollutant of interest for nonroad engines. For VOC emissions, lawn and garden is the most important category, but either construction or recreation and recreational marine may also be important depending upon which inventory is most appropriate. For CO, lawn and garden is the most important category, but construction, and commercial equipment could be very important as well. For NOx and PM, construction equipment is considered the most important single category representing well over half of the emissions regardless of the inventory used.

Temporal Allocation

Temporal allocation of annual emissions estimates are also important in evaluating the emission inventory effect because certain ambient pollutant levels typically vary with the season and occasionally with the day of the week. The monthly fraction of annual equipment usage is shown in Table 2-31. The day of week activity is shown in Table 2-32. These are identical for EPA (1991) and (2000).

Table 2-31. Seasonal allocation for the Southwest region (EPA, 1997b or EPA, 1991).

Equipment Category	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Agricultural	0.020	0.020	0.100	0.100	0.100	0.113	0.113	0.113	0.100	0.100	0.100	0.020
Construction	0.067	0.067	0.078	0.078	0.078	0.110	0.110	0.110	0.078	0.078	0.078	0.067
Industrial	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
Lawn and Garden Excl. chainsaws	0.020	0.020	0.100	0.100	0.100	0.113	0.113	0.113	0.100	0.100	0.100	0.020
Airport Service	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
Logging (incl. chainsaws)	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
Light Commercial	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
Recreational Marine	0.023	0.023	0.075	0.075	0.075	0.160	0.160	0.160	0.075	0.075	0.075	0.023
Recreational Equipment	0.040	0.040	0.085	0.085	0.085	0.123	0.123	0.123	0.085	0.085	0.085	0.040

In order to determine the seasonal allocation for summer and winter days, the fractions for the three summer (June, July, and August) and winter (December, January, and February) months were summed and included in the equation below for the average daily fraction.

*Average Day = Annual Emissions * 4 * Summed Seasonal Fractions / 365*

However, for certain applications the weekend day and weekday activity is different than the average day. So an adjustment was made using the fractions of weekly activity for each day of the week. To use these fractions, the average day total was summed to weekly (simply multiply by 7) totals before applying the weekly activity fractions.

Table 2-32. Default weekday and weekend day activity allocation fractions (EPA, 1991 and 1999b).

Equipment Category	Weekday	Weekend Day
Recreational	0.1111111	0.2222222
Construction	0.1666667	0.0833334
Industrial	0.1666667	0.0833334
Residential Lawn and Garden	0.1111111	0.2222222
Commercial Lawn and Garden	0.1600000	0.1000000
Agricultural	0.1666667	0.0833334
Light Commercial	0.1666667	0.0833334
Logging	0.1666667	0.0833334
Airport Service	0.1428571	0.1428571
Railway Maintenance	0.1800000	0.0500000
Recreational Marine	0.0600000	0.3500000
Transportation A/C Refrigeration	0.1428571	0.1428571
Underground Mining	0.1666667	0.0833334
Oil Field Equipment	0.1428571	0.1428571

Tables 2-33 to 2-36 show year 2000 emission estimates for summer and winter weekday and weekend day estimates. In general, there is more nonroad source activity during summer months, except for various industrial and commercial activities which are expected to have

constant activity throughout the year. These activities, such as airport, industrial, commercial, rail, and to a lesser extent, construction, become more important during the winter as other nonroad categories are used less.

Table 2-33. Clark County summer weekday nonroad emission inventory (tons/day) for 2000.

Category	VOC	CO	NOx	PM
Lawn & Garden	7.1	73.2	0.2	0.11
Airport Service*	0.4	14.8	0.6	0.01
Recreational	5.2	9.5	0.0	0.09
Recreational Marine	2.4	7.0	0.1	0.11
Light Commercial	0.8	26.1	0.2	0.02
Industrial	0.2	2.8	0.4	0.02
Construction	3.0	19.2	22.1	1.86
Agricultural	0.1	0.6	0.5	0.05
Logging	0.1	0.4	0.2	0.02
Aircraft*	1.6	12.3	5.1	0.20
Locomotive**	0.2	0.5	5.9	0.14
Total	21	166	35	2.62

* Ricondo (2000) and Leigh Fisher (1998)
** Converted from 1995 Nevada CO SIP Estimates

Table 2-34. Clark County summer weekend day nonroad emission inventory (tons/day) for 2000.

Category	VOC	CO	NOx	PM
Lawn & Garden	5.1	52.9	0.1	0.08
Airport Service*	0.4	14.8	0.6	0.01
Recreational	10.4	19.1	0.1	0.18
Recreational Marine	13.8	40.6	0.8	0.64
Light Commercial	0.4	13.1	0.1	0.01
Industrial	0.1	1.4	0.2	0.01
Construction	1.5	9.6	11.1	0.93
Agricultural	0.0	0.3	0.3	0.02
Logging	0.0	0.2	0.1	0.01
Aircraft*	1.6	12.3	5.1	0.20
Locomotive**	0.2	0.5	5.9	0.14
Total	34	165	24	2.23

* Ricondo (2000) and Leigh Fisher (1998)
** Converted from 1995 Nevada CO SIP Estimates

Table 2-35. Clark County annual winter weekday emission inventory (tons/year) for 2000.

Category	VOC	CO	NOx	PM
Lawn & Garden	1.2	10.0	0.0	0.02
Airport Service*	0.4	12.6	0.6	0.01
Recreational	1.7	2.4	0.0	0.03
Recreational Marine	0.3	0.9	0.0	0.02
Light Commercial	0.8	20.1	0.2	0.02
Industrial	0.2	2.5	0.4	0.02
Construction	1.8	10.3	13.5	1.13
Agricultural	0.0	0.1	0.1	0.01
Logging	0.1	0.3	0.2	0.02
Aircraft*	1.6	12.3	5.1	0.20
Locomotive**	0.2	0.5	5.9	0.14
Total	8	72	26	1.61

* Ricondo (2000) and Leigh Fisher (1998)
** Converted from 1995 Nevada CO SIP Estimates

Table 2-36. Clark County annual winter weekend day nonroad emission inventory (tons/year) for 2000.

Category	VOC	CO	NOx	PM
Lawn & Garden	0.9	7.2	0.0	0.01
Airport Service*	0.4	12.6	0.6	0.01
Recreational	3.3	4.8	0.0	0.06
Recreational Marine	2.0	5.2	0.1	0.09
Light Commercial	0.4	10.1	0.1	0.01
Industrial	0.1	1.3	0.2	0.01
Construction	0.9	5.1	6.7	0.57
Agricultural	0.0	0.0	0.0	0.00
Logging	0.0	0.2	0.1	0.01
Aircraft*	1.6	12.3	5.1	0.20
Locomotive**	0.2	0.5	5.9	0.14
Total	10	59	19	1.11

* Ricondo (2000) and Leigh Fisher (1998)
** Converted from 1995 Nevada CO SIP Estimates

FUTURE YEAR EMISSION INVENTORIES

For future year projections, similar methods were applied as those to create the year 2000 base year inventory. Year 2000 estimates were grown to a future year, and emissions reductions associated with fleet turnover determined from the NONROAD model were applied using the emission effect. The locomotive benefits already described were applied by weighting the emission effect for switch and line-haul engines by the base emissions levels. No emission reduction was assumed for aircraft regulations.

The base year (2000) emissions estimates were multiplied by the growth factor and the emission effect calculated as shown in the equation below.

*Future Year Estimate = Base Year Estimate * Growth Factor * (1 + Emission Effect/100)*

Temporal adjustments for seasonal and day of the week can also applied to annual total as they were for the year 2000 estimates.

Growth Factors

There are several approved methods to use for growth indicators for nonroad source categories (Lorang, 1994):

1. Project the 1990 inventory by projecting the indicator variables (such as construction employees or dollar valuation for construction) used to estimate equipment population within the current inventory.
2. Develop surrogate variables from BEA to project given categories.
3. Project the 1990 inventory with human population, usually derived from BEA.
4. Project the 1990 inventory using EGAS.
5. Project the 1990 inventory using local activity indicator.

The Bureau of Economic Analysis (BEA) has discontinued indicator projections leaving Economic Growth Analysis System (EGAS) as the only generic source for projection estimates.

Most of the available growth indicators have been calculated and are shown in Table 2-37. These range from specific indicators for nonroad categories and engine types to a simple ratio of expected human population for Clark Co. The human population ignores differences in activity by category of nonroad equipment.

Table 2-37. Growth indicators for Clark County as a fraction of 1996.

Source	Category	2000	2005	2010	2015	2020	2025
EGAS	Recreational	1.16	1.37	1.55	1.70	1.85	1.99
	Construction	1.11	1.21	1.33	1.42	1.52	1.61
	Industrial	1.13	1.28	1.41	1.52	1.64	1.76
	Lawn & Garden	1.16	1.37	1.55	1.70	1.85	1.99
	Commercial	1.15	1.31	1.46	1.59	1.72	1.85
	Logging	1.10	1.16	1.30	1.42	1.67	2.17
	Airport Service	1.22	1.50	1.67	1.83	1.99	2.15
NONROAD	Recreational – Gas	1.01	1.05	1.09	1.13	1.17	1.21
	(Diesel)	(1.13)	(1.30)	(1.47)	(1.64)	(1.80)	(1.97)
	Construction – Gas	1.00	1.01	1.03	1.04	1.05	1.07
	(Diesel)	(1.13)	(1.29)	(1.45)	(1.61)	(1.76)	(1.93)
	Industrial – Gas	0.84	0.64	0.44	0.25	0.15	0.00
	(Diesel)	(1.14)	(1.33)	(1.52)	(1.70)	(1.87)	(2.06)
	Lawn & Garden –	1.09	1.21	1.33	1.45	1.57	1.69
	Gas (Diesel)	(1.26)	(1.60)	(1.95)	(2.30)	(2.63)	(3.00)
	Commercial – Gas	1.14	1.34	1.54	1.73	1.92	2.13
	(Diesel)	(1.18)	(1.40)	(1.63)	(1.86)	(2.07)	(2.31)

	Airport Service – Gas (Diesel)	0.95 (1.28)	1.01 (1.62)	1.07 (1.97)	1.14 (2.31)	1.20 (2.63)	1.26 (3.00)
BEA	Human Population (1.28 for 1996/1990)	1.14	1.28	1.41	1.54	1.65	1.78
Las Vegas	Human Population	1.08	1.28	1.44	1.58	1.70	1.82

The draft NONROAD numbers are also shown for comparison, but these growth estimates were based on estimates of national equipment population using national sales and average estimates of scrappage rates. While not modeled as such, increased national sales may also be accompanied by increased scrappage. The projected fleet mix shows some suspect effects, such as the elimination of gasoline engines for the industrial segment, that result from extrapolating a growth estimate derived from a narrow window of 5-8 years out 25 years or more. Also, this growth estimate ignored regional differences and economic indicators. For these and other reasons, the draft NONROAD growth estimates are not considered to be applicable to local areas.

Another EPA approved and, and in this case, developed model is the EGAS model which attempts to predict regional growth estimates for various emission types including nonroad construction engines. The version of EGAS used for this work was dated August 1995. The EGAS growth indicators have been developed for this project and are shown in Table 2-37. The most important categories for CO emissions (lawn and garden, recreational, industrial and commercial) are quite similar. For NOx and PM, the construction and industrial categories show generally lower growth estimates than other categories.

A good short description of the EGAS model can be found in the excerpt from the E.H. Pechan report to EPA (Pechan, 1997):

> "The E-GAS is an EPA-developed model originally designed to provide growth factors for use in forecasting volatile organic compound (VOC), oxides of nitrogen (NO_x), and carbon monoxide (CO) emissions for ozone nonattainment and attainment areas. The source-specific growth factors generated by E-GAS can serve as input to the Emissions Preprocessor System (EPS) for the Urban Airshed Model (EPA, 1995). The model consists of three-tiers: a National economic tier, a regional economic tier, and a growth factor tier, which are described below.
>
> a. National Economic Tier
>
> To begin running the E-GAS model, it is necessary to specify one of two National macroeconomic forecasts: the Wharton Econometric Forecast Associates (WEFA) forecast or the BLS forecast. The BLS forecast is calibrated to include the current National business cycles using the latest National forecast from the University of Michigan's Research Seminar in Quantitative Economics. The WEFA produces quarterly forecasts under low growth, base case, high growth, and cyclical growth scenarios (the base case forecast is incorporated into E-GAS). Due to its structure, the regional forecasts from E-GAS maintain a consistent assumption about national economic growth.

b. Regional Economic Tier

Output from E-GAS' National tier becomes input into the regional tier, which incorporates regional models developed by Regional Economic Models, Inc. (REMI). The regional economic tier consists of dynamic regional models that simulate the interaction between 14 major sectors of the economy to produce estimates of employment and value added for 210 sectors of the economy. The regional economic tier permits growth factors to differ between rural and urban areas by developing separate forecasts for ozone nonattainment and attainment areas of each State. Information on local policies can be directly entered into E-GAS, permitting assessment of the effects of nonattainment area policies on surrounding areas.

c. Growth Factor Tier

Regional economic tier output becomes input into the growth factor tier. This tier consists of several modules, including:

- A fuel choice module;
- A utility energy module;
- A vehicle miles traveled (VMT) module; and
- A physical output module.

The growth factor tier also includes a crosswalk that translates growth factors from the above modules into growth by source category code (SCC). This crosswalk is important because most emission inventories are categorized by SCC. Outputs from the regional economic tier are used to produce sub-State-level estimates of fuel consumption, VMT, and physical output. For the larger VOC-emitting sources, the physical output module projects growth in physical output from value added estimates generated by the regional economic tier. For nonroad engine application SCCs, E-GAS growth factors are generally based on the value added projections from REMI's regional models."

Pechan determined that the EGAS model was an acceptable method of projecting equipment activity. EGAS and the historic human population estimates were applied to project future year emission levels.

Emission Benefits

As discussed previously, emission benefits of Federal rulemakings for small spark-ignition, marine, and compression-ignition engines were estimated using the NONROAD model to include the expected fleet turnover. Emission reductions for locomotives were described earlier and taken from EPA estimates of the impact of the Federal rule.

Tables 2-38 to 2-42 show emission reductions for converting base year 2000 estimates for future year projections. These reflect an estimate of the overall emission reduction by category for the combined effect of spark and compression-ignition engine regulations.

Table 2-38. Draft NONROAD emission reduction (% change) estimates from 2000 to 2005.

Category	VOC	CO	NOx	PM
Lawn & Garden	-29	-23	-15	-8
Airport Service	-19	-18	-17	-8
Recreational	-4	-6	-6	-5
Recreational Marine	-11	-2	+5	-14
Light Commercial	-23	-20	-8	-6
Industrial	-15	-10	-11	-3
Construction	-26	-31	-17	-2
Agricultural	-21	-11	-14	-9
Logging	-15	-18	-21	0
Railroad	-4	0	-28	-4

Table 2-39. Draft NONROAD emission reduction (% change) estimates from 2000 to 2010.

Category	VOC	CO	NOx	PM
Lawn & Garden	-55	-30	-27	-10
Airport Service	-39	-25	-37	-10
Recreational	-4	-6	-9	-6
Recreational Marine	-22	-5	+11	-29
Light Commercial	-49	-32	-21	-10
Industrial	-28	-14	-25	-3
Construction	-48	-38	-41	-3
Agricultural	-39	-19	-32	-13
Logging	-45	-27	-51	0
Railroad	-16	0	-42	-17

Table 2-40. Draft NONROAD emission reduction (% change) estimates from 2000 to 2015.

Category	VOC	CO	NOx	PM
Lawn & Garden	-59	-30	-31	-11
Airport Service	-50	-26	-53	-10
Recreational	-4	-6	-11	-6
Recreational Marine	-29	-6	+14	-35
Light Commercial	-52	-35	-30	-11
Industrial	-36	-14	-36	-4
Construction	-60	-39	-55	-3
Agricultural	-50	-23	-47	-14
Logging	-57	-32	-60	0
Railroad	-21	0	-47	-23

Table 2-41. Draft NONROAD emission reduction (% change) estimates from 2000 to 2020.

Category	VOC	CO	NOx	PM
Lawn & Garden	-59	-30	-34	-11
Airport Service	-56	-27	-60	-10
Recreational	-4	-6	-13	-7
Recreational Marine	-32	-6	+15	-38
Light Commercial	-53	-35	-36	-12
Industrial	-39	-14	-40	-4
Construction	-62	-40	-58	-3
Agricultural	-55	-25	-55	-15
Logging	-59	-33	-60	0
Railroad	-27	0	-51	-30

Table 2-42. Draft NONROAD emission reduction (% change) estimates from 2000 to 2025.

Category	VOC	CO	NOx	PM
Lawn & Garden	-59	-30	-34	-11
Airport Service	-57	-27	-62	-10
Recreational	-4	-6	-13	-7
Recreational Marine	-33	-6	+16	-39
Light Commercial	-53	-35	-38	-12
Industrial	-39	-14	-41	-4
Construction	-63	-40	-59	-3
Agricultural	-58	-27	-58	-16
Logging	-59	-33	-60	0
Railroad	-32	0	-54	-36

Future Year Inventories

Applying these emission reductions (or increases) and growth projections to the base year emission estimates provides the expected future year emission inventories, shown in Tables 2-43 to 2-47.

Table 2-43. Clark County annual nonroad emission inventory (tons/year) for 2005.

Category	VOC	CO	NOx	PM
Lawn & Garden	1,478	16,498	41	31
Airport Service*	143	5,487	242	4
Recreational	1,877	3,367	14	32
Recreational Marine	1,127	3,660	76	50
Light Commercial	229	7,477	79	7
Industrial	55	887	129	5
Construction	567	3,422	4,743	471
Agricultural	20	146	122	12
Logging	21	107	54	6
Aircraft*	711	5,560	2,295	90
Locomotive**	90	237	1,851	57
Total	6,318	46,848	9,647	756

Table 2-44. Clark County annual nonroad emission inventory (tons/year) for 2010.

Category	VOC	CO	NOx	PM
Lawn & Garden	1,060	16,969	40	34
Airport Service*	120	5,587	204	4
Recreational	2,124	3,810	16	36
Recreational Marine	1,111	3,991	90	47
Light Commercial	169	7,083	75	7
Industrial	51	934	120	6
Construction	438	3,380	3,706	512
Agricultural	17	149	109	13
Logging	15	106	37	7
Aircraft*	791	6,190	2,556	100
Locomotive**	88	267	1,677	55
Total	5,985	48,466	8,631	822

Table 2-45. Clark County annual nonroad emission inventory (tons/year) for 2015.

Category	VOC	CO	NOx	PM
Lawn & Garden	1,059	18,611	41	37
Airport Service*	108	6,041	167	5
Recreational	2,329	4,178	17	40
Recreational Marine	1,109	4,333	102	47
Light Commercial	173	7,374	73	8
Industrial	49	1,006	110	6
Construction	360	3,551	3,018	547
Agricultural	15	155	93	14
Logging	13	109	34	8
Aircraft*	867	6,783	2,801	110
Locomotive**	91	293	1,682	56
Total	6,175	52,434	8,137	877

Table 2-46. Clark County annual nonroad emission inventory (tons/year) for 2020.

Category	VOC	CO	NOx	PM
Lawn & Garden	1,153	20,253	43	40
Airport Service*	103	6,480	155	5
Recreational	2,535	4,547	18	43
Recreational Marine	1,143	4,662	110	48
Light Commercial	184	7,977	72	8
Industrial	50	1,086	111	7
Construction	366	3,738	3,015	586
Agricultural	15	163	85	15
Logging	14	126	39	9
Aircraft*	943	7,376	3,045	119
Locomotive**	91	315	1,673	55
Total	6,597	56,723	8,367	935

Table 2-47. Clark County annual nonroad emission inventory (tons/year) for 2025.

Category	VOC	CO	NOx	PM
Lawn & Garden	1,240	21,786	46	43
Airport Service*	109	7,001	159	6
Recreational	2,726	4,891	19	46
Recreational Marine	1,206	4,991	119	51
Light Commercial	198	8,580	75	9
Industrial	54	1,165	118	7
Construction	378	3,960	3,117	620
Agricultural	15	170	85	16
Logging	19	164	51	12
Aircraft*	1,019	7,969	3,290	129
Locomotive**	91	337	1,681	54
Total	7,053	61,014	8,761	992

Summary

As discussed above, the offroad mobile source emissions inventory for the Las Vegas Valley has received not received much attention until recently. As offroad mobile sources make significant contributions to emissions of VOC, CO, NOx, and PM_{10} in the Las Vegas Valley, the development of an accurate emissions inventory for this source category is important. It is expected, that this will be a relatively straightforward endeavor once the U.S. EPA completes the development of it's NONROAD emissions model. However, until that time, the approach described here represents the best alternative. Again, as was the case with respect to on-road mobile sources, it is important that the need for and scope of potential additional control measures targeting offroad mobile sources be assessed using the latest and most accurate emission inventory models.

ASSESSMENT OF CURRENT LOCAL CONTROL PROGRAMS

STATIONARY AND AREA SOURCE PROGRAMS

Overview of Federal and State Requirements

Federal control programs that directly control emissions from stationary sources are limited to those programs that are applied nation-wide to major or significant industrial categories. Part 60, Title 40 of the Code of Federal Regulations (New Source Performance Standards), establishes emissions limits for new or modified equipment falling with specified categories. These categories typically include the most significant emissions sources in facility categories responsible for the largest portions of stationary source emission inventories across the nation. Typical sources in Clark County regulated by Part 60 include aggregate production facilities, hot mix asphalt plants, Portland cement plants, sewage treatment plants, solid waste landfills, hospital waste incinerators, steam generating units, stationary gas turbines, and petroleum dry cleaners.

The accompanying Part 61 regulates emissions of certain toxic pollutants known to be very injurious to public health. The sources targeted for control with respect to each pollutant are usually those which historically have been the most prolific emitters for that pollutant. In Clark County, Part 61 regulations apply primarily to asbestos removal operations.

Indirect control of emissions from some new or modified stationary sources is exerted by the permitting provisions of Part 52. These provisions require that larger stationary sources be permitted with best available control technologies that are selected for new or modified equipment on a case-by-case basis. The application of these control technologies often results in emissions levels that are substantially below applicable limits imposed by local, state, or other federal regulation. Within Clark County, sources typically affected by Part 52 requirements are those that would emit more than one ton per year of particulate matter (PM) or two tons per year of carbon monoxide (CO), volatile organic compounds (VOC), or oxides of nitrogen (NOx).

Fossil fuel-fired steam generating units in Clark County are directly regulated by the Nevada Department of Environmental Protection and are excluded from regulation by local agencies under Nevada Revised Statutes (NRS) 445B.500. This reservation of authority applies to the Mojave Power Plant in Laughlin, Nevada, Nevada Power Company's Reid Gardner facility in Moapa, Nevada, and fossil fuel-fired boilers at other Nevada Power Company facilities in Clark County.

Nevada Revised Statutes also indirectly regulate emissions from stationary sources in Clark County. NRS 445B.500 requires the district board of health, county board of health or board of county commissioners in each county whose population is 100,000 or more to establish a program for the control of air pollution that includes standards for the control of emissions which are equivalent to or stricter than those established by state statute or regulation. State statutes and regulations generally limit emissions of criteria pollutants from broad classes of sources.

Local Stationary Source Regulations

Control measures applicable to stationary sources in Clark County are adopted and implemented almost exclusively by the Clark County Health District. These control measures are codified in the District's Air Pollution Control Regulations. Among these regulations are nationwide emissions limitations for certain categories of sources by the U.S. Environmental Protection Agency that are adopted by reference. Under Nevada Revised Statutes, control measures applicable to fossil fuel-fired utility boilers are adopted and implemented by the Nevada Department of Environmental Protection.

The scope of stationary source control measures adopted by the Health District is not far-reaching in comparison with programs adopted by other similarly-sized nonattainment areas in the country. With three exceptions, none of the stationary source control measures enacted by the Health District extend in scope beyond the minimum requirements imposed by state or federal law. These three exceptions are Air Pollution Control Regulations Section 12 (Preconstruction Review For New Or Modified Stationary Sources), Section 26 (Emissions of Visible Air Contaminants), and Section 33 (Chlorine in Chemical Processes). The first section imposes permitting requirements that are more restrictive than those imposed by federal law.

The latter two sections either directly or indirectly establish visible emission limitations that are more restrictive than state and federal law.

Section 12 extends the application of control technology and emission offset requirements to sources that are exempt under federal permitting regulations. For example, Section 12 requires the use of BACT for new or modified non-major sources (i.e., having emissions less than federal threshold levels) that propose to increase emissions by greater than de minimis amounts (i.e., 15 tons per year for PM_{10}, for example). This regulation also requires PM_{10} emissions offsets from the road paving program for small increases in emissions of PM_{10}, NOx, VOC, and CO. As discussed elsewhere in this report, however, BACT requirements are sometime no more that the technology needed to meet minimum emissions limits, and the air quality benefits of the road paving program are very questionable.

Section 26 limits visible emissions from new or modified stationary source to zero opacity. As written, this regulation is the most stringent of its type in the nation. In practice, it is completely ignored by the Health District permit writers and enforcement officers. This situation is attributed by Health District staff to a decision issued by the District Hearing Board in an appeal of a permit condition filed by Chemical Lime Company's Apex facility. In the decision, the Hearing Board ruled that the zero opacity requirement of Section 26 was unenforceable and therefore was expunged from the Apex facility's operating permits. The District has taken no action to appeal the Hearing Board's decision or to modify or rescind the applicable portion of Section 26. Instead, the District has simply instructed staff to ignore this regulation. This posture leaves stationary sources that have been constructed or modified since 1983 and which do not comply with the zero opacity limit vulnerable to citizen suit or federal prosecution.

Another provision of Section 26, subsection 26.1.2.7, relaxes the general opacity limit for certain chemical processes, but in a manner that contradicts state regulation. Nevada Administrative Code section 445B.354 limits visible emissions from any stationary source to no more than 20% opacity except for a period or periods aggregating more than 3 minutes in any 1 hour. Clark County Air Pollution Control Regulation 26.1.2.7 limits opacity from certain chemical processes to 40% for a period not aggregating more than 15 minutes or to 30% for a period not aggregating more than 30 minutes in any eight hour period. In this example, the Health District exceeded the authority granted to it by Nevada Revised Statute 445B.500, which requires local regulations to be equivalent or stricter than state regulation, and in this case also exposes stationary sources to third party prosecution.

The other stationary source regulation adopted by the Health District which extends beyond the scope of state and federal minimum requirements is Air Pollution Control Regulation Section 33, Chlorine in Chemical Processes. The Chlorine in Chemical Processes rule was adopted to reduce the substantial visible emission plumes that were visible from throughout the Las Vegas Valley in the early 1980s, and to reduce chlorine emissions that contributed to violations of the one-hour ozone standard. These plumes were generated by the emission of chlorine gas in combination with ammonia, forming highly visible ammonium chloride, and by the emission of other chloride compounds from metal processing operations. These operations commenced operation in the BMI industrial complex adjacent to the city of Henderson in the late 1970s, and operated in violation of opacity regulations for several years while efforts to reduce visible emissions were under study. Instead of limiting the opacity of chlorine-

containing plumes directly, the rule limits the emission rate of free chlorine from any chemical process.

Stationary Source Permitting

The Clark County Health District issues two types of emissions entitlements to industrial sources. Operating Permits are issued on an annual basis to emitting equipment located at permanently sited facilities. Within Clark County, approximately 800 industrial facilities receive such permits. Various Location Permits are issued to equipment that are periodically relocated to new operating sites. The approximately 200 facilities that receive these permits are typically those that produce construction materials such as aggregate, asphalt, and concrete near or on the sites of major construction projects.

Facilities that qualify for Various Location Permits (VLPs) are frequently those that are set up to supply materials to short-term construction projects. Because of the short timelines typical of construction, the Health District has set up a streamlined permitting process for VLP applications. Even though District rules limit annual emissions from VLP sources to 15 tons of PM_{10} per year, sources with greater emission potentials continue to apply for these permits because of the time savings offered to qualifying sources. In some cases, facilities annually processing more than 1 million tons of aggregate per year have been granted VLP permits, even though such facilities would have to be virtually dust free in order to stay below the eligibility limit.

Many new or modified stationary sources are required to use Best Available Control Technology (BACT) under the Clark County Health District permitting regulations. BACT is determined on a case-by-case basis for each affected permit application, and the method for selecting BACT for major facilities and modifications is required to conform with U.S. Environmental Protection Agency guidance. The EPA guidance requires that a study of control technologies be conducted in which operational costs and emissions benefits be determined. Under this guidance, the permitting agency is required to select that control technology that provides the greatest emission benefit at reasonable cost. The definition of reasonable cost is left to the permitting agency.

Health District permitting analyses generally fail to comply with the EPA BACT guideline. For aggregate production facility permits, for example, a single control measure is typically evaluated and approved for the control of PM_{10} emissions from processing equipment. This control measure is the maintenance of a prescribed moisture content in the material being processed. No assessment of the relative cost effectiveness of other control techniques, such as fabric filter collectors, is conducted as required by the EPA guidance.

To extend current permitting analyses to include the evaluation of fabric filter technologies would not require substantial additional effort because of the availability of a good resource document on this subject developed by the Midwest Research Institute (MRI).[10] In 1993, the Health District contracted with MRI to evaluate BACToptions for sand and gravel facilities. The report includes emission benefit and cost estimates for water spray, wet scrubber, and

[10] PM_{10} Emission Control Study For Sand and Gravel Processing Facilities, Prepared for Clark County Health District Air Pollution Control Division by Midwest Research Institute, August 1993.

fabric filter controls. In its conclusions, the report recommends the selection of fabric filters (baghouses) as BACT for the control of PM_{10} emissions from crusher and screen systems, and wet suppression as BACT for conveyor transfer systems.

The MRI report also recommends the use of emissions factors for aggregate operations that are considerably lower than those used by Health District permit evaluators. The emissions factors currently used by the District to estimate emissions from aggregate operations are those generally in vogue in the early 1980s. The MRI data reflect the results of several emissions testing studies that EPA and others conducted in the early 1990s. These studies used more sophisticated emissions sampling methods than those on which the earlier emissions factors were based. As a result, District permitting staff are using outdated emissions factors in the evaluation of these sources, and the accuracy of these evaluations are brought into question.

Another example of inappropriate emissions analysis stems from the use of an overly simplistic methodology for determining the emission control efficiency of wet suppression methods on aggregate production equipment. The control efficiency attributed to increased moisture content in aggregate being transferred from one conveyor to another, or from a conveyor to a stock pile, is estimated by MRI based on an emission equation published by EPA in 1995[11]. As indicated in AP-42, the emission equation applies only to emissions from aggregate streams in free fall drops. It does not apply to screening and particularly crushing operations, for which separate emission factors are provided. When aggregate is crushed, new dry faces are created which generate dust emissions regardless of the moisture content of the original aggregate surface.

Manpower and office space allocations to the Air Quality Division's stationary source permit writers are very limited. During 1999, 651 permit entitlements were issued to stationary source applicants by seven permit specialists. The rate at which entitlements are issued increased 41% between 1998 and 1999, while the number of specialists remained the same. Office space allocations for the permit specialists also compromise the efficiency of operations. The manager of one stationary source permit branch, for example, shares a 12 foot by 14 foot office with a secretary and another permit specialist.

Enforcement of Stationary Source Requirements

Perhaps the gravest deficiency in the control of air pollutant emissions from stationary sources in Clark County lies in the enforcement of regulations and permit conditions applicable to these emissions from existing facilities. For the approximately 1000 facilities holding Operating Permits or Various Location Permits in the county, air pollution control enforcement rests on the shoulders of a single Health District inspector. The unit within the District that is charged with stationary source responsibility is also required to inspect approximately 500 gasoline service stations, 200 dry cleaning establishments, and various asbestos demolition projects. Because these latter facilities require some priority, and because the unit has effectively only 3 inspectors, only a small number of stationary sources are inspected on an annual basis.

[11] Compilation of Air Pollutant Emission Factors, Volume 1, Fifth Edition, U.S. Environmental Protection Agency, January 1995

In order to comply with EPA inspection priorities under severe staffing limitations, the Compliance Unit of the Health District is forced to limit its inspections to certain groups of stationary source facilities. These include all major sources (those required to have federal Title V operating permits), sources which voluntarily reduce emissions in order to stay out of the Title V permit program, and sources capable of emitting hazardous air pollutants in significant quantities. Sources that do not receive inspections include all aggregate production facilities, and all small- to medium-size manufacturing facilities.

Typical staffing levels of stationary source inspectors are substantially higher in other southwestern urban areas. For example, the California Air Resources Board recommends that the assignment load of an inspector in any air pollution control district in California not exceed 300 to 500 facilities. Under this standard, the Health District should have 2 to 3 inspectors dedicated solely to the inspection of stationary sources.

The lack of adequate staffing levels may reflect a lack of priority on the part of the Health District for maintaining acceptable standards of compliance from stationary sources. Certainly, this inference is supported by the independent actions of the U.S. Environmental Protection Agency. Since 1992, EPA Region 9 has issued 12 notices of violation against facilities operating in the county. These notices have documented violations ranging from failure to conduct required compliance source testing to failure to obtain appropriate permits prior to constructing polluting equipment. In the majority of these cases, the Health District was aware of the violations.

Local Area Source Regulations

As with stationary sources, control measures applicable to area sources in Clark County are adopted and implemented almost exclusively by the Clark County Health District. Many of the measures applicable to areawide hydrocarbon sources are required by federal and state regulation, and are designed to prevent ozone levels in Clark County from exceeding the national ambient air quality standards. The measures applicable to fugitive dust sources were adopted in an effort to reduce emissions from significant sources responsible for causing violations of the federal PM_{10} standard.

The hydrocarbon area source control measures represent the minimum level of regulation required by state and federal regulation. For those source categories affected, such as gasoline service stations, the regulations are roughly equivalent in effectiveness to those enforced in other southwestern urban areas.

For PM_{10} area sources, the sophistication of control effort level is somewhat variable. With respect to construction activities, for example, Clark County has one of the more advanced regulations and probably the most sophisticated enforcement programs in the nation. With regard to unpaved roads, on the other hand, local efforts are focused on reducing emissions through an incentive program (paving unpaved roads to earn emission reduction credits necessary for stationary source expansions), and program effectiveness cannot be determined because of the lack of adequate emission reduction accounting. Finally, for disturbed vacant lands, no control measure is currently in place in Clark County.

Area Source Permitting

Several of the most significant area sources categories in Clark County are regulated under permit systems operated by the Health District. These sources include commercial and institutional combustion units, standby emergency generators, gasoline service stations, and construction activities, among others. These permit systems are generally extensive, in that the District attempts to enroll under permit as many of the eligible equipment units as can be found. It is not clear, however, what fraction of eligible equipment units in these subject categories have been enrolled. While the planning and building departments of several governmental jurisdictions in the Las Vegas Valley forward information to the Health District on entitlements issued to new installations required to have air quality permits, this practice is not universal. Also, no other quality assurance tests, such as comparing cumulative fuel use data collected from combustion unit operators to total fuel sales information provided by vendors, are regularly conducted to ascertain the coverage of the permit system.

Manpower levels allocated by the Health District to area source permitting tasks are very marginal. One permit writer is responsible for enrolling and maintaining files for approximately 500 gasoline service stations. Another is responsible for issuing permits to over 2000 new construction projects each year. This latter workload is equivalent to issuing almost one permit an hour for the single employee performing this task. As with stationary source permitting, office space allocated to area source permit writers is very cramped.

Enforcement of Area Source Requirements

The effectiveness of area source enforcement programs administered by the Clark County Health District varies by program. The construction activity enforcement program, for example, is one of the most sophisticated in the nation. The gasoline service station program, on the other hand, is less effective than similar programs in other southwestern urban areas. The strengths and weaknesses of these programs are related primarily to manpower allocations.

The construction activity enforcement program targets what the emission inventory suggests is the largest source of PM_{10} emissions in the Las Vegas Valley. In assigning priority to the reduction of emissions to this source, the Health District's Air Quality Division has formed a separate branch tasked solely with the job of enforcing District regulations and permit conditions applicable to construction projects. This branch has seven field inspectors, a good information outreach program, and a training and certification program for construction contractors. During 1999, this branch issued 1275 Corrective Action Orders and 211 Notices of Violations related to construction violations.

The enforcement program devoted to gasoline service stations and dry cleaners, by comparison, is spread thinner. One inspector from the Air Quality Divisions Compliance branch is responsible for verifying compliance from approximately 500 service stations.

With respect to fugitive dust sources, control measures are currently enforced on several, but not all, of the most significant area source categories in Clark County. For those categories that are controlled, programs are reasonably effective. For the categories that are

uncontrolled, such as disturbed vacant lands, emissions continue to substantially contribute to ambient air quality violations.

Summary of Effectiveness of Stationary and Area Source Programs

As noted previously, based on the existing, albeit flawed, emission inventories for stationary and area sources, these sources do not account for the bulk of emissions of CO. Therefore, even though there are serious deficiencies in the Clark County programs for stationary and area sources, they do not materially affect compliance with the CO NAAQS.

Both emission inventory data and other information confirms that area sources do account for the bulk of the PM_{10} emissions in the Las Vegas Valley. Therefore, problems with the effectiveness of current programs could contribute to continued violations of the PM_{10} NAAQS. However, monitoring data for PM_{10} suggest that annual average ambient concentrations have been declining since the advent of monitoring in 1988, and are also now hovering on the nonattainment threshold. With respect to the annual PM_{10} standard, only a sharp increase in the frequency of soil disturbance occurring near one of the historically high-reading PM_{10} monitors or the gutting of the construction emission control program would prohibit attainment within the next few years. With respect to the 24-hour PM_{10} standard, air quality monitoring data also indicate that peak 24-hour concentrations remain highly variable and strongly dependent on high wind episodes. It is impossible to forecast from this data when attainment of the 24-hour PM_{10} standard might be achieved. It is however safe to say that without the implementation of additional controls on windblown dust sources, the Valley will remain nonattainment for the 24-hour PM_{10} standard. In order to reduce emissions effectively from significantly contributing sources, more analyses of source contributions need to be conducted, and more categories of area sources need to be controlled. Until more is known about the relative contributions of uncontrolled disturbed vacant lots and controlled construction sites, for example, efforts to fine tune PM_{10} control strategies will be misdirected.

Finally, with respect to ozone precursors, the concerns with both the existing stationary and area source inventories make it difficult to assess the relative contribution of those sources to current and future ambient ozone levels in Clark County. The problems with both the inventories and current Clark County control programs make it difficult to assess the effectiveness of current control programs, but it is clear that improvements in the enforcement of existing regulations would result in reductions in ozone precursor emissions.

Current Local On-Road Mobile Source Control Measures and Effectiveness

Clark County I/M Program – The Clean Air Act Amendments of 1990 led the U.S. Environmental Protection Agency (EPA) to promulgate new regulations defining the minimum acceptable specifications for "basic" and "enhanced" I/M programs (final rule, dated November 5, 1992). Under EPA regulations, areas within ozone transport regions, or with "serious" or "severe" ozone nonattainment and meeting certain population criteria, must implement enhanced I/M. In addition, enhanced I/M focused only on CO emissions (i.e., no testing of the evaporative emission control system) was required in CO nonattainment areas with design values of >12.7 ppm at the time of classification (in other words, some moderate areas and all serious areas). This CO criterion triggered the requirement for enhanced I/M in Clark County, Nevada.

In September of 1995, EPA amended its definition of "enhanced I/M" by creating a less stringent, "low enhanced I/M" definition that certain areas are allowed to use. The term "high enhanced I/M" was also created to cover the requirements applicable in enhanced I/M areas that do not qualify for the less stringent, low enhanced requirements. The criteria used to determine whether an area qualifies for low enhanced make it difficult to easily determine which areas qualify. The basic concept is that an area qualifies for low enhanced if it can achieve "Reasonable Further Progress" and project attainment of the ambient air quality standards without a high enhanced I/M program. Based on the State Implementation Plan, Clark County currently qualifies for use of a low enhanced program.

With these changes, the low enhanced inspection procedures are not significantly different from EPA's "basic" I/M program procedures. The only significant difference in inspection procedures is that an OBD check on 1996 and later models and a visual inspection of the PCV valve and EGR valve is required in the low enhanced program, but not the basic program. A more significant difference is that the basic I/M requirements do not require light-duty trucks to be tested. A counter-intuitive difference between the programs is that the enhanced programs require a $450 repair cost expenditure (with certain exemptions) to obtain a waiver, but waivers are not allowed under the basic program. A similar inconsistency exists with respect to the compliance rate. The enhanced I/M standard is based on a 96% compliance rate, but the basic I/M standard is based on a 100% compliance rate.

It is important to note that neither the Clean Air Act nor EPA's regulations define enhanced I/M in terms of specific emissions reductions; the basic requirement is that the emissions reductions achieved by the program be equivalent to the reductions achieved by a specific type of program. Table 2-48 summarizes EPA's estimates for the reduction in emissions from the on-road fleet as reported in three separate Federal Register notices.*

Table 2-48. EPA's estimates for the reduction in emissions from the on-road fleet.

	EPA Estimates for I/M Program Reductions (%)		
	HC	**CO**	**NOx**
Basic	6.3	10.8	0.7
Low Enhanced	9.3	14.2	1.5
High Enhanced	28.0	30.0	9.0

The estimates shown in the table are based on EPA's MOBILE5b model. Among other things, this model "discounts" the effectiveness of programs under which tests are conducted at private repair facilities by approximately 50%. Although controversial, this discount for "decentralized" testing is supported by undercover vehicle testing programs showing that falsified inspection results are a common problem in such programs. It should also be noted that the use of T2AT to develop the on-road motor vehicle emissions inventory will lead to lower effectiveness estimates for I/M programs relative to MOBILE5b.

*Basic I/M reductions reported in Federal Register Vol. 60, No. 204, October 23, 1995 (I/M OTR Flexibility Amendments, NPRM); Low enhanced reductions reported in Federal Register Vol. 60, No. 82, April 28, 1995 (I/M Flexibility Amendments, NPRM); and Enhanced I/M reductions reported in Federal Register Vol. 57, No. 215, November 5, 1992 (I/M Program Requirements, Final Rule).

The current Clark County I/M program involves annual emissions tests and visual inspections at private repair facilities for all 1968 and newer vehicles, except for the two newest model years. For gasoline-fueled vehicles, simple, "BAR90" analyzers are used to measure HC, CO and CO_2 emissions (to check dilution) during an idle/2500 rpm test. Visual inspection for pre-1981 vehicles includes only the fuel cap. For 1981 and newer vehicles, visual inspection also includes fuel inlet restrictor, air injection system, catalyst, EGR, and the malfunction indicator light (MIL) on OBD-equipped vehicles. There is no functional test of the evaporative emissions control system (including the gas cap).

Diesel-powered vehicles are tested only for opacity, so reductions in HC, CO, or NOx are not expected to be significant. Light-duty Diesel vehicles (<8500 GVWR) are tested at 40 mph on a dynamometer. Heavy-duty Diesel vehicles are inspected during random pull-overs using the snap idle test.

Table 2-49 shows how the features of the Clark County program compare to EPA's definition of a low enhanced I/M program and the California program (as it was operating in 1993).

Table 2-49. Inspection and Maintenance Program comparisons.

Feature	Low Enhanced	California 1993	Clark County
Program Type	Annual Centralized	Biennial Decentralized	Annual Decentralized
Vehicles Subject	1968 and later cars and light trucks	1966 and later cars and light trucks	All 1968 and later cars and trucks
Test Procedures	Idle/2500	Idle/2500	Idle/2500
Standards for 1981+	220 ppm HC 1.2% CO	100-120 ppm HC 1.0-1.5% CO	220 ppm HC 1.2% CO
Visual Inspections	PCV, EGR, OBD II	Comprehensive	Fuel cap pre-1981, AIR, CAT, EGR, Fillpipe/Cap >81+
Evap Test	None	Visual Only	Visual gas cap check only
Repair Cost Ceiling	$450	$175-300	$450
Enforcement	Not an issue for centralized	Substantial	Less than California
Est. Emissions Reductions	9.3%/14.2%/1.5% HC/CO/NOx	15.8%/13.5%/4.9 % HC/CO/NOx	7.1%/7.0%/0% HC/CO/NOx

A comparison with the 1993 California program has been included because it is similar to the current Clark County program and the actual effectiveness of the California program was evaluated using FTP testing of over 1,000 undercover vehicles taken through the program by individuals posing as ordinary motorists. This evaluation resulted in estimated emission reductions of 18.2% for HC, 15.3% for CO, and 6.7% for NOx (for vehicles going through the program). Translating these reductions to the entire on-road fleet would reduce the benefits to approximately 15.8% for HC, 13.5% for CO, and 4.9% for NOx.*

*The adjustment is based on the assumption that heavy-duty Diesel vehicles and motorcycles are excluded from the program and that out-of-state vehicles and vehicles evading the program account for 10% of gasoline-fueled

As shown in Table 2-49, the current Clark County I/M program is quite similar to the EPA definition of a low enhanced program except for the fact that the Clark County program is "decentralized". This would be expected to substantially reduce the benefits of the Clark County program. Based on the approximate 50% discount for decentralized testing assumed in the EPA model, the Clark County program would be expected to be providing reductions of only 4.7% for HC, 7.1% for CO, and 0.8% for NOx. As shown in Table 2-49, the use of T2AT in this analysis resulted in estimated fleet wide reductions of 7.8%, 7.6%, 0% for HC, CO and NOx. Using the California program evaluation results as a benchmark, the reductions achieved by the Clark County program could be as high as 15.8% for HC, 13.5% for CO, and 4.9% for NOx. However, ENVIRON believes the Clark County program is likely to be less effective than the 1993 California program because the level of surveillance and enforcement activity in California is unmatched by any other state, the visual and functional inspection requirements in California were more comprehensive, and the California emission standards were more stringent.

Overall, the Clark County I/M program is likely generating moderate reductions in emissions of HC and CO from vehicles subject to the program and probably not resulting in any significant reduction in NOx emissions from those vehicles. However, as discussed elsewhere program improvements could lead to greater emission reductions.

Clark County Winter Gasoline Requirements

During the winter months, gasoline sold in Clark County must meet specifications regarding RVP as well as oxygenate, sulfur, and aromatic content. Specifically, the gasoline must have an RVP of 9 psi or less, an oxygenate of at least 3.5% by weight, a sulfur content in the range from no more than 30 to 80 ppm depending on the compliance option chosen by the refiner and an aromatic content in the range from no more than 22 to 30 volume percent again, depending on the compliance option chosen.

The percentage reductions in on-road mobile source emissions of winter VOC, CO, and NOx during calendar year 2000 are presented in Table 2-50. These estimates were prepared by assuming that the "baseline" gasoline would have no oxygenate, would have an RVP of 12.2 psi, and a sulfur level of 120 ppm. The specifications for RVP and sulfur were based on a review of survey data collected by the National Institute for Petroleum and Energy Research (NIPER) during the winter of 1990 - 1991 in Arizona, Southern Nevada, and Southeastern California.

Table 2-50 shows significant reductions in VOC (28%) and CO (34%) as a result of current fuel regulations, while relatively small reductions occur in NOx emissions (4%). The VOC reduction is primarily related to the decrease in RVP, while both oxygenated fuel and the RVP decrease play a substantial role in the CO reduction. The sulfur reduction has only a moderate impact on all pollutants.

vehicle emissions. The adjustment for NOx exceeds the adjustment for other pollutants because of the disproportionate contribution of heavy-duty Diesel vehicles to total on-road NOx emissions.

Table 2-50. Reductions in the wintertime on-road motor vehicle calendar year 2000 inventory as a result of current gasoline regulations.

Category	VOC	CO	NOx
On-Road Mobile	28%	34%	4%

Transportation Control Measures (TCMs)

TCMs comprise a wide variety of measures that reduce travel behavior, increase traffic flow, or both. For example, measures such as ridesharing or telecommuting can reduce emissions by reducing the number of drivers on the road; improving computerized traffic signal systems can improve the flow of traffic and reduce delays. Clark County is working on several fronts to develop and implement TCMs.

Current programs include the following:

- Park and Ride Lots
- Implementation of regional bike plan
- Freeway management systems
- Traffic signal improvements
- Purchase of Compressed Natural Gas (CNG) Fueling Stations
- Transit Services
- Study of projects such as high-speed rail between Southern California and Las Vegas and implementation of fixed guideway system along strip
- Transportation Demand Management (CATMATCH)

In addition, a detailed study of possible TCMs was completed in April, 1998 by the firm Lima and Associates. The study examined congestion pricing, employer-based trip reduction programs, ridesharing, bicycle incentives, work schedule changes, telecommuting, no drive days, and some measures that are more technological in nature (I/M, alternative fuels, and reformulated gasoline) which are covered elsewhere in this report. The study concluded that, of the measures that affected travel behavior, employer-based programs and no-drive days would be the most effective. It also concluded that, overall, the most effective measure in terms of both emissions reduction and cost would be enhanced I/M.

The RTC has been implementing the recommendations of the study through the development of the CATMATCH program, which is an employer-based program.

With the exception of CATMATCH and transit services, none of the other existing programs is relied upon in local air quality plans for significant emission reductions although all do reduce emissions somewhat. Past experience in Las Vegas and other U.S. air quality nonattainment areas has shown that programs such as bikeways, park and ride lots, or traffic signalization projects, while providing important components of a successful TCM program, typically provide emission reductions in the range of less than 1/10 of a percent. Since this study is intended to examine the effectiveness of Clark County air programs, the focus of evaluation of the TCM program is on the CATMATCH program, which is included in the most recently submitted carbon monoxide plan for significant emission reductions.

CATMATCH. The RTC has recently developed an energetic and creative approach to reducing work-related travel through the provision of incentives to both employers and employees to travel to work in ways other than single occupant vehicles (SOVs). The program is based on an intensive public/private partnership with local businesses. RTC staff are currently working directly with 20 local employers representing a significant proportion of Clark County employees. The 20 employers include numerous large casinos and several government agencies. Benefits to employers include a federal tax credit for each participating employee as well as reduced need for maintaining employee parking spaces and increased morale through participation in programs involving more flexible work hours and decreased stress associated with commuting on heavily congested freeways.

The program includes the following nine major components:

1. Provision of outreach through presentation display and tabletop display systems to provide information about the benefits of commute alternatives at business expos and transportation fairs throughout the region;

2. Club Ride, which provides incentives to employees through monthly prize drawings entered by swiping a Club Ride credit card through veriphones being installed by participating employers. The card is swiped after each instance of using alternative commute options, and random checks are conducted to ensure honest use of the cards;

3. Preferential parking for carpoolers and vanpoolers;

4. Emergency Ride Home for Club Ride members needing rides home in an emergency when their car has been left there as a result of program participation;

5. Marketing and advertising on billboards, TV/Radio stations, and newsletters for professional, home owner and community associations;

6. Monthly special events for special community outreach on events such as "Bike-to-Work" day, or Try Transit Day;

7. Travel Assistance Information: provision of transit schedules to public on the internet and at kiosks at key public locations. Users may enter their location and destination and receive schedule, fare and directions, or simply view known routes and status;

8. Flexifare transit passes, which use pre-tax dollars to pay for transit use. These passes use magnetic card reading technology, which tracks and records each trip taken on the bus. The passes are good for one year and users are only charged for transit trips actually taken (in contrast to purchasing a standard pass for a preset amount and good for only a month); and

9. Partnership with vanpool leasing company.

The program seems to be gaining ground quickly. Estimates of participation are modest for the year 2000, with a projected participation rate of 2,500 employees. Participation is

expected to grow to 25,000 participants by the year 2020. This corresponds to 3/10 of a percent of total employees in the year 2000 and 2.3 percent of employees in the year 2020.

Current estimates of emission effectiveness included in the draft CO plan are based on the following assumptions:

1. 2,500 participants on an average day;
2. 1,800 reduced single occupant vehicle users;
3. Two trips per day reduced (one to, and one from work) at an average distance of 7.5 miles); and
4. Emission factor of 10.92 grams per mile (approximate emission rate for a typical vehicle travelling at a speed of 32.9 mph; the system-wide average speed in the Las Vegas area).

Using these assumptions, the CATMATCH program is estimated to reduce CO by approximately 1/3 a ton per day in the year 2000. The cost of the program is expected to be $911,000 per year to the RTC. Costs to employers are expected to be balanced by the benefits as it is a voluntary program. Therefore, the cost per ton of CO reduced, based on the RTCs assumptions, is $8,320. If tons of PM, VOC and NOx were considered the costs would be much smaller. No agencies have made estimates for reduced particulate matter, VOC or NOx reductions from the program. In Task 2, cost and effectiveness estimates for all four pollutants for a range of future years are provided.

CATMATCH Discussion. It will be difficult to assess the effectiveness of the program until actual data is collected from the participating employers and employees. However, the estimates of participation appear quite reasonable given the extent of outreach, the clear benefits to employers and employees for participating in the program, and the very real frustration of commute traffic in the Las Vegas Valley.

The assumptions used in the calculations could be improved, as could documentation for the basis of the assumptions. The following improvements would be particularly useful:

- Documentation on emission factors used - what version of the model, and which vehicle classes are affected. Emissions vary widely depending on whether a vehicle is a passenger car, light truck, van, or 18-wheeler. The required EPA model for calculating emissions from vehicles provides emissions by vehicle category as well as for the entire fleet (averaged across all categories in proportion to their makeup in the area's fleet). It is not clear whether the emissions are for the fleet, which would not be appropriate, or for the most likely affected vehicles (participants in ridesharing and other travel demand management programs tend to drive passenger cars and light trucks such as sport utility vehicles;
- Documentation on the roadway types and speeds at which travel is assumed to be reduced. Emissions per mile driven as a function of speed vary by a factor of up to four or five, so the assumed speed or speeds at which travel is assumed to be reduced can significantly affect the estimated emission reductions;
- Documentation on the reasoning for assuming a 7.5 mile trip length;
- Documentation on how the number of participants is converted to a number of SOVs reduced;
- Documentation on how existing carpooling is factored into the calculations of benefits; and

- Discussion of any increased emissions due to vanpools or transit buses (as these vehicle have higher gram per mile emissions than the passenger cars and trucks they would be replacing).

Alternative Calculation

Using the same assumptions as the RTC regarding participation rates, and average trip lengths but the alternate emission factors developed for this study, the following emission factors are used[12]:

Table 2-51. Emission factors for CATMATCH program.

Pollutant	Average of Light Duty Autos and Trucks (g/mile)	Average of Light Duty Autos and Trucks (g/trip)
CO	6.27	23.20
VOC	1.55	1.42
NOx	1.92	0.663

Particulate matter is more challenging as the emission factors for entrained road dust are under revision in preparation for development of the PM_{10} plan. PM_{10} re-entrained road dust factors used in the January, 2000 TIP conformity analysis are used as an interim calculation.

PM exhaust emissions for passenger cars and trucks (including both PM_{10} and sulfate) are 0.018 grams per mile (weighted average). Entrained road dust factors for principal arterials are 0.39 g/mile.

Using the RTC assumptions as noted above, VMT is reduced by 27,000 miles per day and 3,600 trips per days are reduced (1,800 SOV trips times two trips: one to and one from work).

The following emission reductions result:

Table 2-52. Emission reductions resulting from CATMATCH program in 2000 (tons per day).

Pollutant	VMT Reductions	Trip Reductions	Total TPD
CO	0.19	0.09	0.28
VOC	0.046	0.006	0.05
NOx	0.057	0.003	0.06
PM Exhaust	0.0005	Not Applicable	0.0005
PM Dust	0.012	Not Applicable	0.012

[12] For consistency with the RTC calculations it is assumed that all travel reduced is at a speed of 35 mph on freeway facilities. In addition, the CO factor is for winter while the VOC and NOx factors are for summer conditions. PM is not affected by season. Finally, the new model will calculate emissions from starting vehicles. Grams per trip are reported separately.

According to the RTC, by 2020 results will increase by a factor of more than ten. Future year effectiveness is discussed in Chapter 3.

Other Programs

In addition to the above, there are programs focused on promoting the use of alternatively-fueled on-road vehicles and a smoke inspection program for heavy-duty vehicles in operation in the Las Vegas Valley. However, because the scope of these programs is relatively limited at this point, they are not generating significant emission reductions at this time. These programs are addressed as potential additional local control measures in Chapter 3.

EFFECTIVENESS OF CURRENT LOCAL GASOLINE AND DIESEL FUEL SPECIFICATIONS IN REDUCING EMISSISONS FROM OFFROAD SOURCES

Currently, the only local control measures in place that affect nonroad engines are the winter gasoline requirement and the year-round use of lower sulfur diesel fuel. The winter gasoline specifications include an RVP limit, oxygenate requirements and sulfur and aromatics limits are intended primarily to reduce carbon monoxide emissions from on- and nonroad engines. Lower sulfur in diesel fuel results in reductions of particulate matter emissions.

Table 2-53 shows the emission reductions the winter gasoline specifications. EPA (1997) had reported that some NOx increase would be expected with the use of oxygenates, but the draft NONROAD model is in error and does not report an increase in NOx. This NOx increase if could significantly increase NOx emissions estimates for those categories dominated by the emissions of gasoline-powered engines, but would probably not have a significant impact on total off-road NOx emissions as they are dominated by emissions from diesel-powered equipment.

Table 2-53. Draft NONROAD emission reductions (%) from winter gasoline.

Category	VOC	CO	NOx	PM
Lawn & Garden	-3	-23	0	0
Airport Service	-1	-15	0	0
Recreational	-2	-23	0	0
Recreational Marine	0	-11	0	0
Light Commercial	-3	-23	0	0
Industrial	-1	-9	0	0
Construction	0	-12	0	0
Agricultural	-1	-18	0	0
Logging	0	-12	0	0
Railroad Maintenance	-1	-18	0	0

Highway diesel fuel of less than 500 ppm sulfur is used for all diesel fuel and this fuel typically runs about 400 ppm sulfur. Typical nonroad diesel fuel has no sulfur requirement and typically runs about 3,300 ppm, so two NONROAD model runs were compared to produce the PM emission reductions shown in Table 2-54 associated with the use of the lower sulfur fuel.

Table 2-54. Draft NONROAD emission reduction (%) from using highway diesel in nonroad engines.

Category	VOC	CO	NOx	PM
Lawn & Garden	0	0	0	-24%
Airport Service	0	0	0	-11
Recreational	0	0	0	-1
Recreational Marine	0	0	0	-1
Light Commercial	0	0	0	-22
Industrial	0	0	0	-40
Construction	0	0	0	-12
Agricultural	0	0	0	-21
Logging	0	0	0	-12
Railroad Maintenance	0	0	0	-15

EMISSION INVENTORY SUMMARY AND FUTURE AIR QUALITY IN CLARK COUNTY

Emission Inventory Summary

As discussed in detail previously, there are four major categories of emission sources, stationary, area, on-road mobile and off-road mobile. This section summaries the data developed regarding these sources and addresses the relative contribution of each source category to total emissions of VOC, CO, NOx and PM_{10} in the Las Vegas Valley for the year 2000.

Total year 2000 emission inventories for VOC, CO, NOx, and PM_{10} for the Las Vegas Valley are show in Figures 2-32a and 2-32b, for the summer and winter seasons. Note that seasonal estimates are not available for either the stationary or area source categories nor for PM_{10} emissions from on road vehicles. Therefore, the average daily values are used in both figures. As shown in the figures, the current CO emission inventory is dominated by on- and nonroad mobile sources, with stationary and area sources making only limited contributions. Therefore, despite the concerns regarding the accuracy of the stationary and area source inventories, it is clear that any additional controls implemented in the Las Vegas Valley to reduce CO emissions should target the mobile source categories.

In contrast, based on the available data, area sources represent by far the most significant source of PM_{10} emissions, dwarfing the contributions from the other sources. However, as noted above there is considerable uncertainty regarding both the area and stationary source inventories for PM_{10}. Despite this, it is clear that measures targeting PM_{10} reductions from mobile sources cannot be substituted for stringent controls on emissions from area sources if ambient PM_{10} concentrations are to be substantially reduced in the Las Vegas Valley.

Turning to the issue of VOC and NOx, which are precursors to ozone formation, none of the four source categories is clearly dominant. As shown in the figures, area sources are estimated to account for a significant fraction of the VOC inventory. This coupled with the uncertainties with both the area and stationary source inventories for VOC suggests that VOC control measures targeting these sources should be considered along with additional VOC

controls on mobile source categories. For NOx, stationary sources are based on current data responsible for a significant fraction of the inventory particularly when one again considers the higher degree of uncertainty in that inventory relative to the mobile source inventories. Therefore, to the degree that NOx emissions need to be reduced in the Las Vegas Valley, additional controls targeting stationary sources as well as on-road mobile sources should be considered. It also appears that, to the extent that there are problems with the enforcement of existing requirements limiting stationary source NOx and VOC emissions, it will be important to remedy those problems.

Future Air Quality in the Las Vegas Valley

As discussed previously, Clark County is close to attainment of the NAAQS for CO, needs substantial additional reductions in area sources emissions to approach attainment of the NAAQS for PM_{10}, and may be classified as non-attainment with respect to the new 8-hour based NAAQS for ozone as well as the NAAQS for $PM_{2.5}$ if and when those standards are imposed.

Although there are no future year forecasts available for the stationary and area source inventories, a review of the current inventories for those sources combined with the available forecasts for mobile sources provides considerable insight into the future air quality in the Las Vegas Valley and the need for additional controls.

Beginning with CO, Figure 2-33 shows winter CO emission forecasts for all mobile sources from 2000 to 2025. Since stationary and area sources make only minor contributions to CO emissions, the trends in CO emissions overtime relative to year 2000 emissions provide an indication of the degree to which additional controls will be required. As shown, mobile source CO emissions are projected to decrease over time relative to 2000. Therefore, although a great deal of attention needs to be paid to the microscale inventory around the East Charleston monitor, it does not appear that additional local controls capable of achieving dramatic additional reductions in CO emissions will be required to either bring the Las Vegas Valley into attainment or assure that it remains in attainment for the foreseeable future. Again, that is not to say that the implementation of additional local controls is unwarranted, rather to point out that the need for additional local controls should be carefully evaluated in terms of their necessity.

For PM_{10}, the imposition of additional controls on area sources is of primary concern to reduce ambient concentrations and bring the area into compliance with the NAAQS. As noted above, the controls needed to achieve this are being identified as part of the SIP development process currently underway. However, it may be necessary to obtain if possible additional reductions in PM_{10} emissions from mobile sources. As shown in Figure 2-34, PM_{10} from mobile sources is forecast to increase over time and nonroad sources dominate the mobile source PM_{10} inventory. Therefore, additional controls directed at that source category are likely to yield the greatest reductions. Additional controls on PM emissions from mobile sources may also be required if the Las Vegas Valley is determined to be in non-attainment for $PM_{2.5}$, as the relative contribution of mobile source emissions to total $PM_{2.5}$ emissions will be substantially greater than it is to total PM_{10} emissions.

As discussed above, the Las Vegas Valley is currently in attainment with respect to the 1-hour ozone NAAQS but may be determined to be in nonattainment with the 8-hour ozone NAAQS if that standard is imposed. A non-attainment designation would require reductions in VOC and NOx emissions relative to current emissions. As a result, it will be important to develop reliable estimates of VOC and NOx emissions from stationary and area sources in the Las Vegas Valley both at present as well as for the future. With respect to mobile sources, Figures 2-35 and 2-36 show that VOC and NOX emissions, respectively, will both decrease until around 2015 and then level off or increase slightly in future years. Also, the figures show that both on- and nonroad mobile sources make substantial contributions to the total mobile source inventory. Therefore, to the extent that it is determined that additional reductions in mobile VOC and NOx emissions are required in Clark County, additional local control measures targeting both on- and off-road vehicles should be considered.

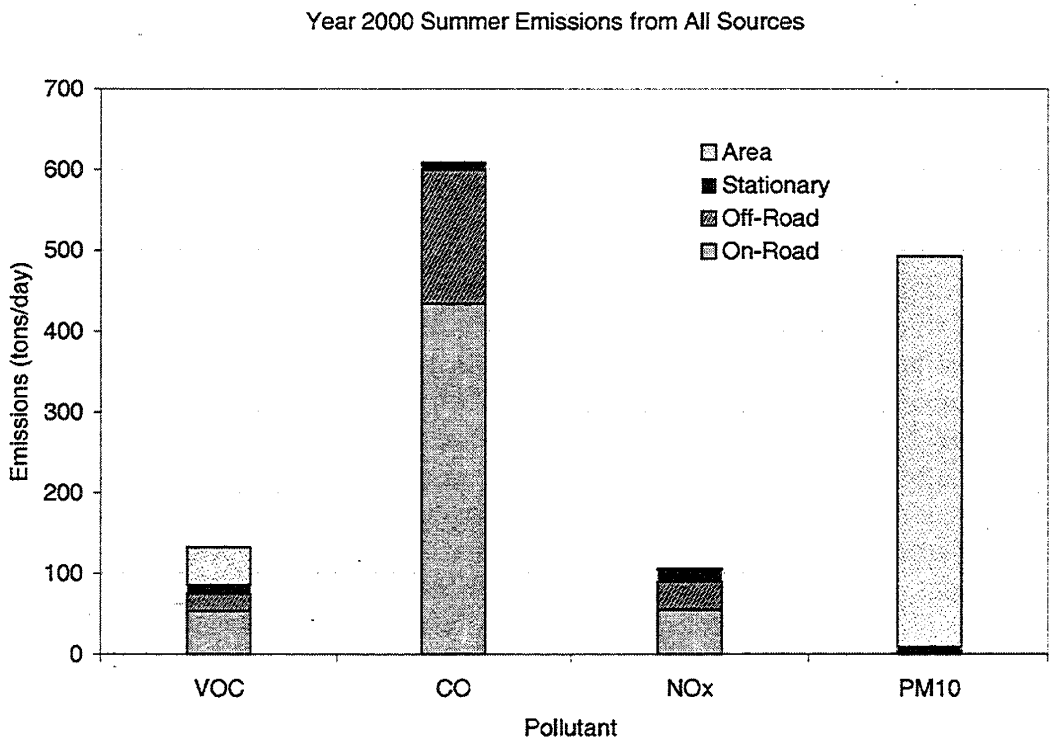


Figure 2-32a. Year 2000 summer emissions from all sources.

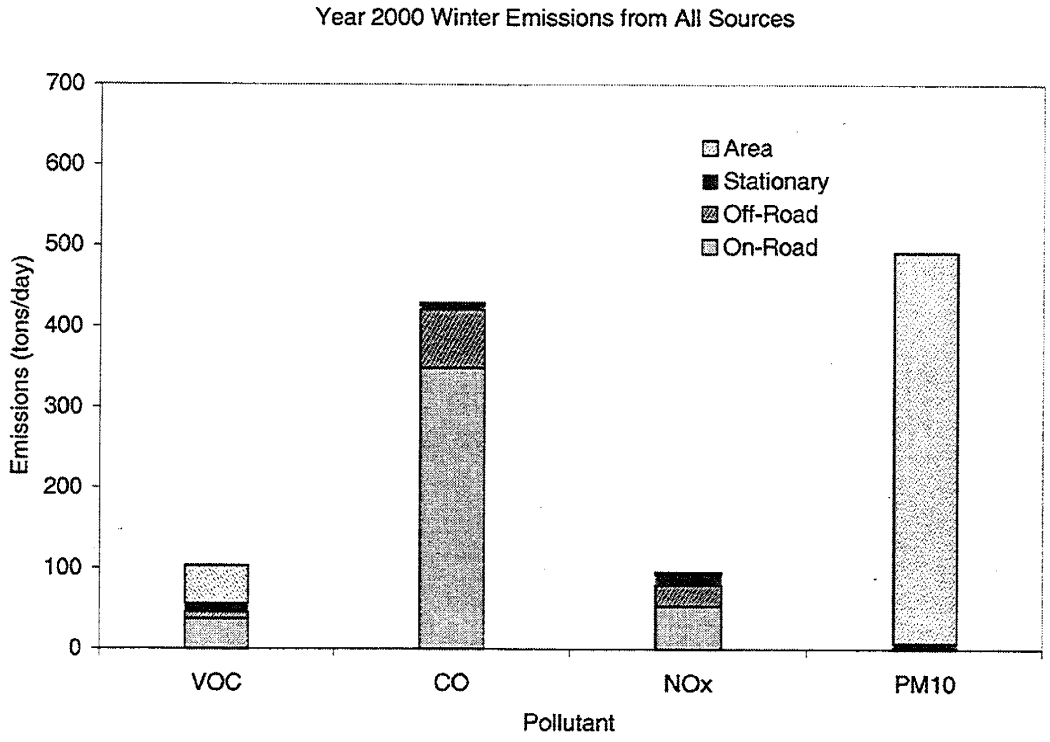


Figure 2-32b. Year 2000 winter emissions from all sources.

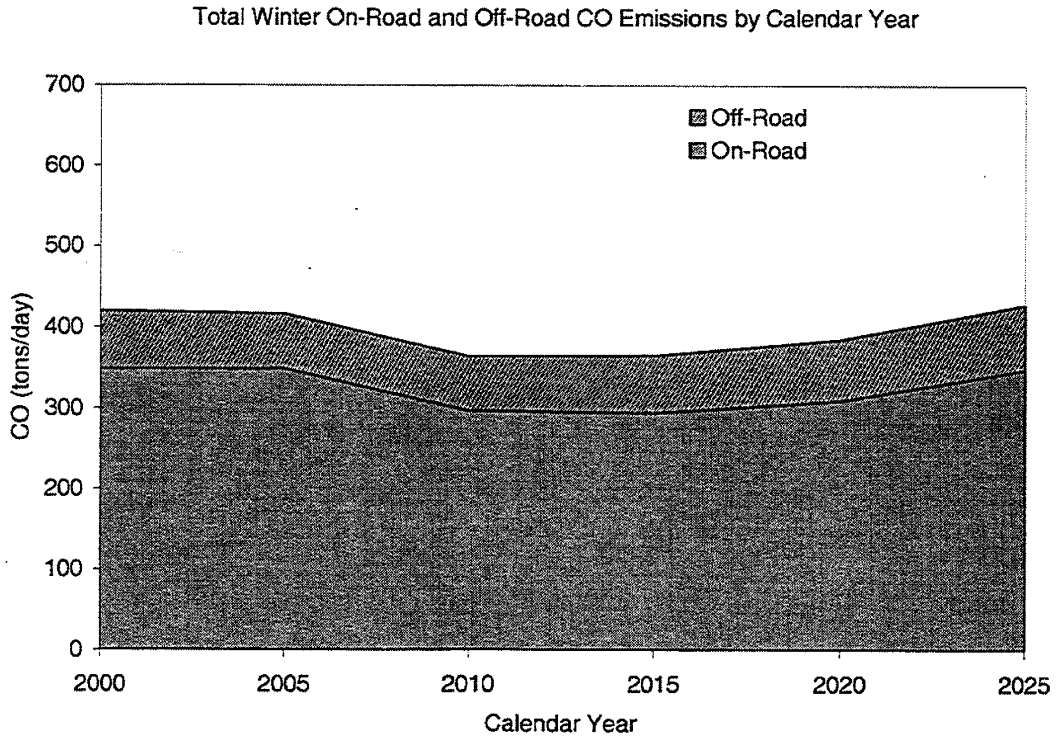


Figure 2-33. Total winter on-road and off-road CO emissions by calendar year.

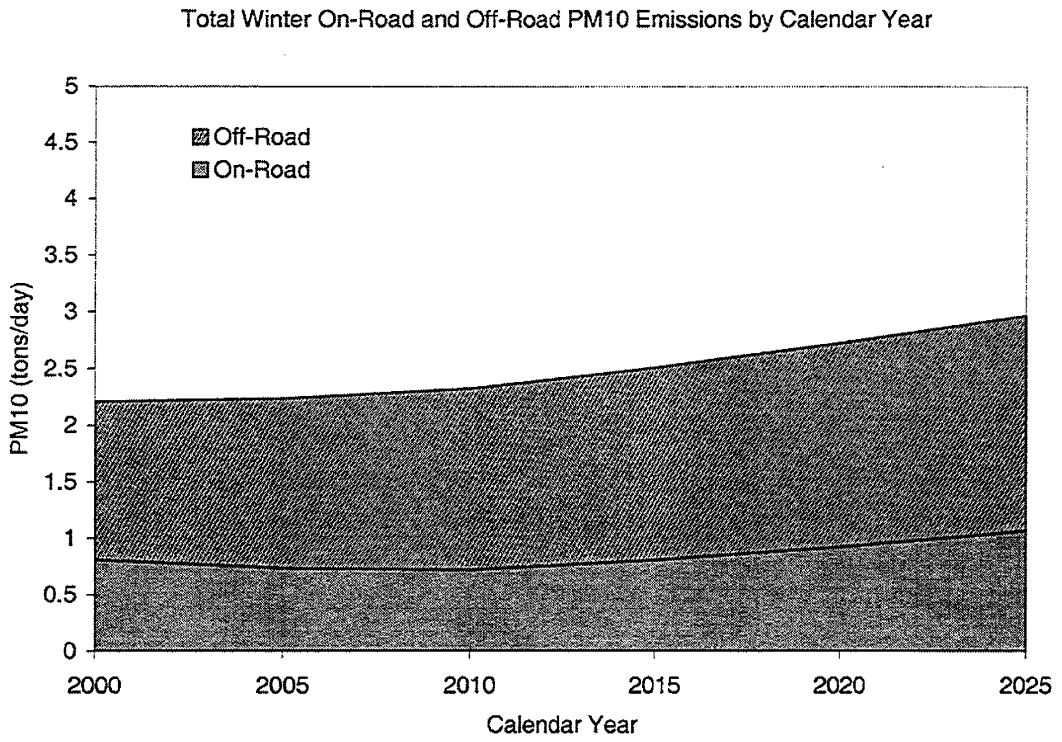


Figure 2-34. Total winter on-road and off-road PM_{10} emissions by calendar year.

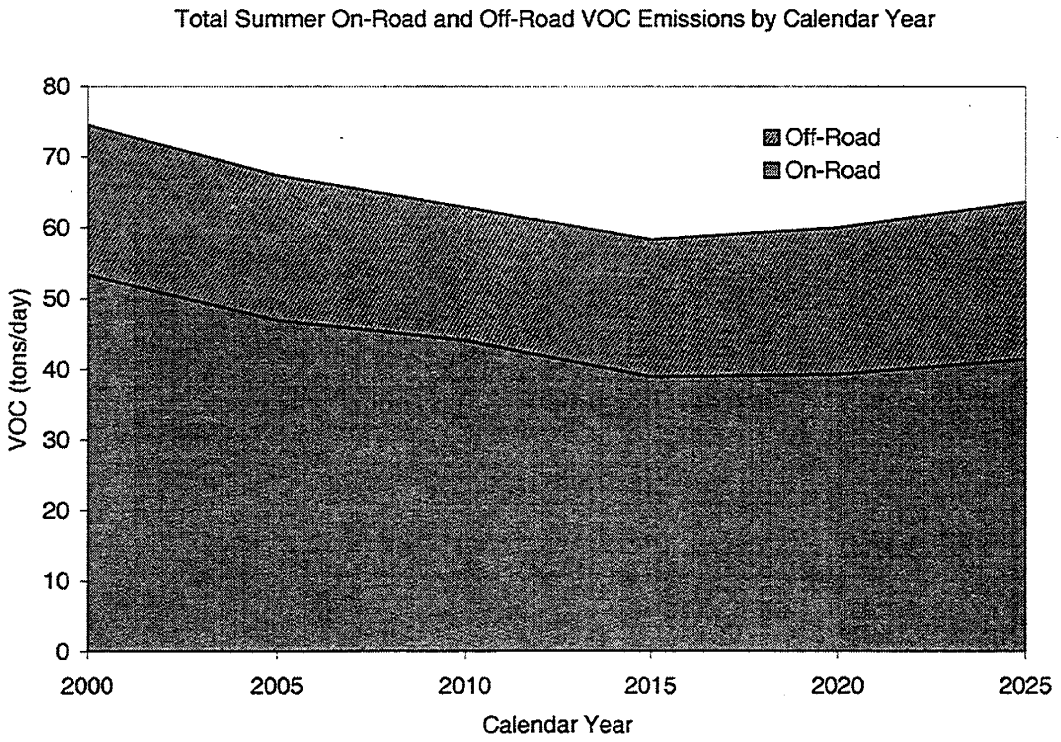


Figure 2-35. Total summer on-road and off-road VOC emissions by calendar year.

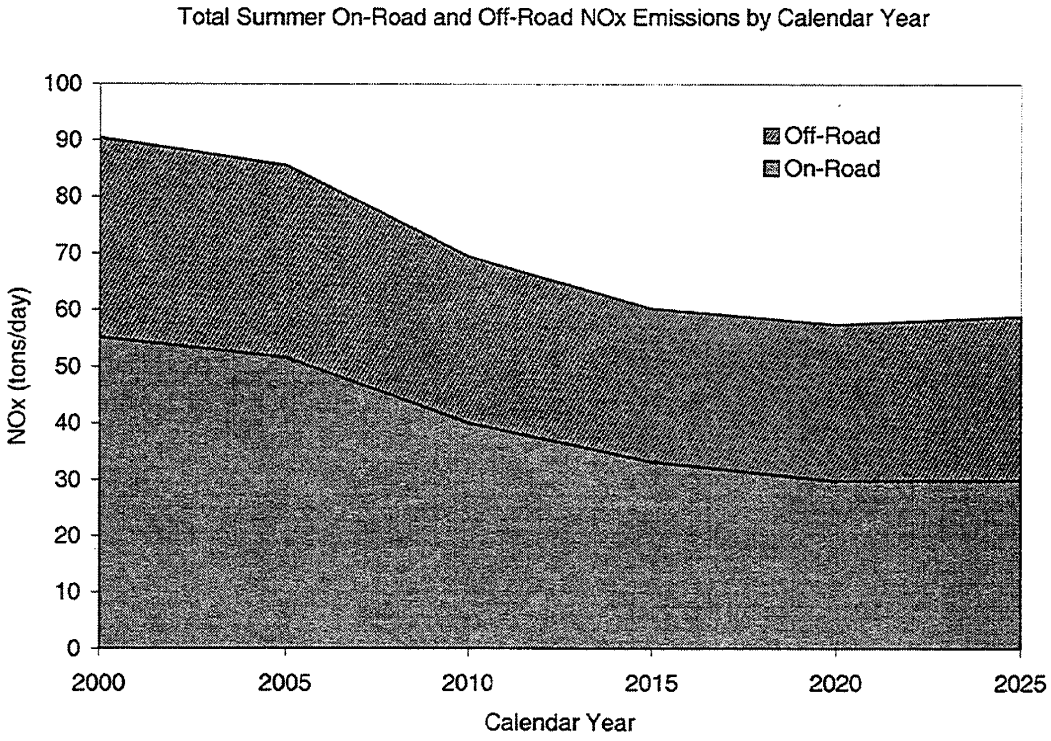


Figure 2-36. Total summer on-road and off-road NOx emissions by calendar year.

3. IDENTIFICATION AND EVALUATION OF POTENTIAL FUTURE AIR POLLUTION CONTROL MEASURES FOR CLARK COUNTY, NEVADA

INTRODUCTION

Overview

As noted in Chapter 2, there are four major categories of emission sources in the Las Vegas Valley: stationary, area, on-road mobile, and off-road mobile. Based on the data presented in Chapter 2, regarding current and future inventories, the following conclusions were reached with respect to each pollutant regarding the need for implementation of additional control measures:

- CO – Additional future reductions from on- and off-road mobile sources relative to the baseline inventory for this study which includes federal Tier 2 standards might be required to attain the NAAQS;

- PM_{10} – Additional controls targeting area sources will be required to attain the NAAQS;

- Ozone Precursors (VOC and NOx) - Limitations associated with the available monitoring data for ambient ozone concentrations in the Las Vegas Valley make it unclear as to whether the area will be in attainment with the proposed eight hour NAAQS. Therefore, it is unclear as to whether or not additional reductions in VOC and NOx emissions will be required. The level of uncertainty regarding the need for future controls beyond those included in the baseline inventory is exacerbated by the issues identified with the existing stationary and area source VOC and NOx emission inventories and the issues associated with the effectiveness of current control programs targeting VOC and NOx emissions from these sources; and

- $PM_{2.5}$ – Again, limitations associated with monitoring data for ambient $PM_{2.5}$ concentrations make it unclear as to whether or not the area will be in attainment with the proposed NAAQS for this pollutant. Given this, it is not clear whether reductions in direct $PM_{2.5}$ emissions or emissions of precursors to secondary aerosol formation (both organic species, i.e. VOC, and inorganic species, e.g. NOx, SOx , NH3, etc.) will be required. In addition, given the important role $PM_{2.5}$ plays with respect to visibility and regional haze, reductions in direct $PM_{2.5}$ emissions and precursors to secondary $PM_{2.5}$ may be required to comply with recently promulgated federal regulations, as well as to address the perceived[1] increased haze in the Las Vegas Valley.

[1] We refer here to "perceived" increase in haze, or the corresponding reduction in visibility or visual range. We use the term "perceived" to acknowledge voiced concerns by the general public. Nevertheless, we are not aware of any objective analyses that has been carried out in the Las Vegas Valley to quantitatively determine if the perceived haze increase is actually occurring over time. Desert Research Institute is just now beginning to collect such data.

Overall, it is unclear, with the exception of PM_{10} controls for area sources, the degree to which additional control measures over and above those assumed to be in place in the baseline inventories (e.g., Tier 2 vehicle standards, low sulfur gasoline, federal regulations regarding emissions from off-road sources, etc.) will need to be implemented in the Las Vegas Valley in order to achieve compliance with the applicable NAAQS. Given this, one purpose of this report is to identify potential control measures that could be applied to obtain further reductions in emissions of all of the pollutants identified above. The other purpose is to evaluate the emission reduction potential, cost, and feasibility of implementing the potential measures identified. In addition, this study attempts to rank the relative desirability of implementing different measures based on their cost-effectiveness.

General Methodology

In the sections that follow, the potential additional control measures identified and evaluated for stationary and area sources and on- and off-road mobile sources are discussed. The first step in this process was a review of air quality planning documents developed for other areas with air quality problems. Based on this review and the uncertain degree of need for the adoption of control measures targeting pollutants other than PM_{10}, a subset of measures felt to be representative of the range of measures that could be considered for application in the Las Vegas Valley was selected for detailed evaluation.

As described in more detail below, the emission benefits associated with each potential control measure were estimated using an approach that was consistent with that used in developing the baseline emission inventory for each pollutant. It must be noted that the emission reduction estimates provided here are based on the assumption that each measure is implemented relative to the baseline in the absence of other measures. In reality, the simultaneous implementation of a number of measures must be specifically evaluated because the emission reduction potential of any given measure depends on what other measures are or will be in place at the time of implementation.

The cost of each potential measure was approximated using the best available information. However, it must be stressed that the cost estimates presented in this report are approximate and a detailed cost analysis specific to the Las Vegas Valley should be performed prior to the formal adoption of any of the measures evaluated here. Other factors evaluated included the cost-effectiveness, technical feasibility, and political, social, and public acceptability of the measures. Of these factors, cost-effectiveness warrants some additional discussion here.

Within any given area, the selection of additional control measures should be based on the principle of obtaining the emission reductions necessary to achieve attainment at the lowest possible cost or, in other words, in the most "cost-effective" manner possible. In practice, the concept of cost-effectiveness in the air pollution control field has been based on a metric which is simply the ratio of the costs associated with an air pollution control measure to the emission reductions that measure is expected to provide. The units of cost-effectiveness ratio are generally dollars per ton of emissions eliminated, with measures having lower ratios (e.g. fewer dollars spent per ton of emissions eliminated) being preferred to measures with higher ratios.

Unfortunately, there is no consensus regarding the value of the ratio that establishes the boundary between cost-effective and cost-ineffective air pollution control. In addition, there is

no consensus on the way in which the cost-effectiveness of measures that reduce emissions of several different pollutants should be evaluated. However, the California Air Resources Board is attempting to deal with the issue of what value of the cost-effectiveness ratio constitutes a reasonable upper bound for control measures. CARB provides a list of average and highest rates as a function of pollutant for CO, PM, VOC and NOx. This list is given in Table 3-1, and shows that the highest values for cost-effectiveness ratios are considerably larger than the average values, and the ratios for some types of pollutants (e.g. VOC and NOx) are considerably larger than for others (e.g. CO and PM). CARB has also attempted to deal with the related issue of how to account for the reductions in emissions of several pollutants that can result from a single control measure. Again, CARB does not specify a recommended approach, but does note, with respect to motor vehicle control measures, that CO reductions can be discounted by a factor of 7 to account for the fact that CO reductions typically exceed VOC and NOx reductions by that factor. Table 3-1 also presents a highest value for the cost-effectiveness ratio for this approach based on the average of the highest values for the four pollutants.

Another common approach for evaluating the impact of ozone control strategies is to assess cost-effectiveness based on the sum of VOC and NOx emission reductions, which presumes that the two pollutants are of equal importance with respect to ozone formation. While there is insufficient data available to evaluate the validity of this assumption for Clark County, this metric has also been included in the evaluation of control measures for on- and off-road mobile sources. In this case, the limits for the average and highest rates listed in Table 3-1 for VOC and NOx would also apply to the sum of VOC and NOx.

Table 3-1. Average and Highest Cost-Effectiveness Ratios Specified by CARB.[2]

	Cost-Effectiveness Ratios ($/ton)	
Pollutant	**Average Rate**	**Highest Rate**
VOC	4,000-10,000	22,000
NOx	2,000-10,000	24,000
CO	200	2,000
Particulate Matter	---	10,000
Combined[a] VOC+NOx+(CO/7)+PM	---	14,500

[a] Based on the average of the highest rates for each pollutant.

The values presented in Table 3-1 and the method of addressing combined pollutants are presented here only to provide a point of reference for the assessing the cost-effectiveness ratios computed for the potential control measures evaluated in this study. In this report, the cost-effectiveness ratio given for a single pollutant, e.g. VOC, represents a situation where the total cost of the control measure is assumed to apply to the control of VOC emissions. Put another way, the cost-effectiveness ratio assumes that the measure is being implemented only to control VOC emissions. This is the reason why the combined pollutant metrics VOC+NOx and VOC+NOx+PM+CO/7 were used as another means of evaluating measures.

[2] "California Clean Air Act Cost-Effectiveness Guidance". Office of Air Quality Planning and Liaison, California Air Resources Board, September 1990.

The proper approach for evaluating the need for implementing additional controls and selecting the appropriate control measures for implementation requires an air quality planning process which:

1. Develops accurate emission inventories for all sources of the pollutant of concern for current and future years over the relevant time period;

2. Identifies through air quality modeling or some other sound technical approach the magnitude of the reductions in the emissions of the pollutant of concern required to achieve compliance with the air quality goal;

3. Assesses a suite of possible control measures targeting all sources in terms of their emission reduction potential, cost, and cost-effectiveness; and finally

4. Selects for implementation those measures which yield the needed emission reductions at the lowest cost – or, in other words, in the most cost-effective manner.

Therefore, the results of this report should be considered only as a guide in terms of determining which additional control measures should be implemented in the Las Vegas Valley.

This study has resulted in the evaluation of many air pollution control measures or programs that have the potential to reduce air pollution and improve ambient air quality. Later in this report, ENVIRON provides details of each of those measures. ENVIRON has included an evaluation of the following potential control measures and programs:

- Adopt CA Standards for Large (>25HP) Spark-Ignition Off-Road Engines
- Reduce Summer Reid Vapor Pressure (RVP) – Off-Road
- Retrofit of Existing HDDVs with SCR
- Earth Berm Along Edge of Open Area for Fugitive Duct Control
- Paving of 8-ft. Shoulder to Control Fugitive Dust from Paved Roads
- Stabilization of PM from Unpaved Roads, Alleys and Easements
- Reduce Summer RVP – On-Road
- Covering Soil Surface of Unpaved Parking Lots with Aggregate
- Asphalt Concrete Over Unpaved Parking Lots
- Road Side and Periodic Smoke Inspection for On- and Off-Road
- Paving 4-ft./Aggregate on 4-ft. Shoulder for PM Control at Paved Roads
- Fencing for Fugitive Dust from Open Areas and Vacant Lots
- SCR Retrofit – Off-Road
- Low Emissions Diesel Engine Repowering for HDDVs
- Improved I/M – Centralized Testing
- Natural Gas Retrofit for HDDVs
- Improved I/M – Centralized Testing+IM240+Evap System Testing
- Scrappage Program
- CATMATCH TCM
- Diesel Fuel/Water Emulsions – Off-Road
- California Phase 3 RFG – Off-Road
- Oxidation Catalysts for Off-Road Engines

- Natural Gas Vehicle Fleet Rule – Lt. Duty Trucks (8.3 RVP)
- California Phase 3 RFG – On-Road
- Natural Gas Vehicle Fleet Rule – Lt. Duty Trucks (7.0 RVP)
- Natural Gas Vehicle Fleet Rule – Passenger Cars (8.3 RVP)
- California Diesel Fuel – On-Road
- Diesel Fuel/Water Emulsions – On-Road
- California Diesel Fuel – Off-Road
- Natural Gas Vehicle Fleet Rule – Passenger Cars (7.0 RVP)
- Accelerated Purchase of Cleaner Diesel Engines – Off-Road
- CA LEV II Emissions Standards
- Fleet Rule – Buy Natural Gas HDDVs
- Parking Price Increase TCM
- Retrofit of Existing HDDVs with PM Traps
- Particulate Trap Retrofit – Off-Road
- Ultra Low Sulfur Diesel Fuel – Off-Road
- Visitor Programs TCM
- Ultra Low Sulfur Diesel Fuel – On-Road

Research

In the Las Vegas region, as in many other areas of the country that have air pollution problems, there has been considerable research into the sources, causes, characteristics, effects, and potential solutions to the air pollution problems. Over the course of this project, as well as specifically in work carried out that lead to this Task Report, ENVIRON has reviewed much such past research. Further, many of the members of the evaluation team that carried out this work have been heavily involved in the air pollution technical field for many years, and thus have both broad experience as well as substantial knowledge of the state of research specific to the Las Vegas area.

In this chapter, as well as in other sections of this report, ENVIRON often acknowledges data or analytical shortcomings that preclude a definitive conclusion on the best course to take in addressing future air pollution problems in the Las Vegas region. So, while many air pollution studies have been carried out, there is significant work yet to be done.

Recognizing both the past research and the need for additional research and data gathering, it is important to learn from that past research in going forward with the future research. In this regard, ENVIRON has observed a significant need for improvement in the manner in which such research is carried out in the Las Vegas region. Simply put, there is a need for more effective coordination among the various institutions funding research or the regulatory agencies to which the research results should be directed. Research is funded by the Health District through the Air Quality Division, by the Department of Comprehensive Planning, by the State legislative process funding of special projects by the university system, and other research studies carried out under the authorization of the Department of Aviation and the Regional Transportation Commission. As a result of the air pollution research coordination shortcomings, there is also a lack of optimum effectiveness of such research in attaining the goals of cleaner air in the region. Aggravating the situation, at least to some degree, is the perception by some in the scientific community that the quest for an improved scientific knowledge base is jeopardized by privileged treatment of the Nevada University system. That

is, a more open procurement process, rather than the sole source award of grants for university research, would result in a better targeted use of available research dollars having the objective of improved and maintained air quality. This is not intended to improve the research capabilities of the University of Nevada in any manner. The authors of this report recognize that other factors often influence the award of research grants, and cost effectiveness of the research results is not always the factor with the highest priority. For example, research funding is often used to maintain a certain level of competency or to underwrite the ongoing teaching effort of a learning institution. Thus, while a targeted focus and management by objective approach may yield better air pollution control program related products, other benefits may not be derived by the university. Nevertheless, it is important that, to the degree possible, this decision be a conscious one. Agencies have also justified sole source awards to the University of Nevada because of the need for expeditious work. However, there is no evidence that, overall, there is an improvement in the timely completion of work simply because it has been awarded on a "fast-track" sole source basis.

In Chapter 5, ENVIRON makes recommendations for certain organizational changes in the management of air quality in the Las Vegas region. Those recommendations incorporate the recognition that this research organization and prioritization be better managed. Better management includes:

- Timely, up-to-date documentation of current air pollution research activities
- Full and complete documentation, organization, and accessibility of past research
- Centrally coordinated identification of needed research, analytical methods, or data collection
- Air quality management objective to be served by the proposed research
- Prioritization of research objectives to best serve the air pollution management objectives
- Objective evaluation of the most effective manner of accomplishing research objectives
- Effectively coordinated/collaborative research overview
- Regular, periodic (e.g., quarterly), interagency coordinated, documented, technical workshop forum presentations of on-going research

POTENTIAL ADDITIONAL CONTROL MEASURES FOR STATIONARY AND AREA SOURCES

Stationary Sources

At the present time, it appears that there are no potential additional control measures applicable to stationary sources being considered for implementation in the Las Vegas Valley. However, several of the potential area source control measures targeting PM_{10} emissions that are being considered for adoption in the Las Vegas Valley will apply to fugitive dust sources at stationary source facilities.

In terms of potential additional control measures, the limitations associated with the stationary source emissions inventory and uncertainties associated with enforcement of existing controls preclude any meaningful evaluation of the emission benefits or costs of additional measures. However, there are a number of general measure categories that should be evaluated once the limitations described above have been remedied.

Specifically, for VOC control, Clark County has no rules that specifically regulate VOC emissions from the following industrial sources: wastewater separators, pumps and compressors, valves and flanges, pressure relief devices, asphalt air blowing, spray coating operations, paper coating operations, plastic coatings, rubber coatings, foam manufacturing, and adhesive application. Regulations targeting emissions from these sources have been evaluated, determined to be cost-effective, and implemented in other areas. However, as both the form, stringency, emission benefits and costs associated with rules targeting these sources can vary from area to area, they need to be assessed specifically for the Las Vegas Valley. Similarly with respect to NOx emissions, Clark County has no rules that specifically limit NOx emissions from the following sources: boilers < 100 MMBTU/hr, stationary IC engines, flares, process heaters, and cement kilns. Again, rules targeting emissions from these sources have been evaluated, determined to be cost-effective, and implemented in other areas, but must be evaluated specifically for the Las Vegas Valley when it is practical to do so. Finally, small reductions in PM_{10} emissions from stationary sources might be gained from the implementation of a particulate concentration ("grain-loading") rule limiting the emission rate of particulate from the spectrum of industrial operations. While such a rule would have little impact on sources constructed with BACT since 1980, sources older than this would be better controlled. This rule is standard with almost every air quality regulatory agency in the nation. In addition, small PM_{10} reductions could be realized from a combustion contaminant rule that imposes a particulate concentration limit on combustion sources.

Also, a significant deficiency in the existing permitting rules and policies implemented by the Health District should be corrected. This deficiency relates to the manner in which one of the requirements of permitting larger emission sources, that which requires the securing of emission reduction credits, is implemented.

New Source Review Program - Like all areas of the country that are designated "nonattainment" for one or more national standards, the Clark County Health District (CCHD) is required by federal law to operate a new source review (NSR) program. Under NSR, new or expanding sources that increase emissions above specified thresholds must offset their increases by reducing existing emissions in the area by an equal or greater amount. In addition to the required NSR program, the CCHD has developed add-on local requirements to offset emission increases from many source categories that are not required to offset emission increases under NSR. The following analysis addresses one of the add-on programs: extensive and complex requirements to reduce fugitive emissions of PM_{10}.

In principle, the add-on PM_{10} programs show considerable creativity and have worthy goals. Unfortunately, the programs have not been as effective in the real world as envisioned. The Health District's administration of the offset requirements in Section 12 of district rules has drawn litigation, become a lightening rod for criticism and damaged the District's credibility with the public. The CCHD has acknowledged many of the problems disclosed by the press in two major articles in 1997 and 1998. These programs are so deeply flawed that they need to be re-examined and replaced with more effective programs.

New and expanding sources which increase emissions of PM_{10} by more than 1 ton per year are required to offset their emissions increases by obtaining emission reduction credits (ERCs) at a 2:1 ratio. Under Section 12.4.5, there are four options for generating new ERCs:

- Directly fund the paving of publicly maintained roads. These "road paving credits" are good for 7 years.

- Pay a prescribed fee to the Health District. The fees are to be passed on to participating local public works departments for funding paving projects. Fees buy road paving credits in one ton increments that are valid for one year.

- Make reductions at industrial sources by shutting down emission units or installing controls. These "industrial process credits" must meet the basic statutory requirements of federal law, are generated in units of tons per year, and are permanent.

- Plan or fund the planting of trees in the Boulder City and El Dorado Valley Management Areas. Each tree creates a permanent "urban forestry credit" worth 100 pounds per year.

The Health District administers credit programs as an extension of its permitting function. The CCHD reviews applications to create ERCs for technical validity and conformance with regulatory requirements. The CCHD seeks to insure that sources that need credits have obtained valid credits as needed. Finally, credits generated by any of the four options are documented in a publicly available accounting system called the Registry.

Emission offset programs are not unique to Clark County. California also has add-on local requirements that extend offset requirements to sources that would not be required to obtain them under federal law. Many of California's credit programs are as stringent as the Clark County programs, but are less complex. California air districts have not had the history of administrative problems the CCHD has experienced. While all offset programs, including those operated in California, have their strengths and weaknesses, California programs have worked reasonably well and have not generated public controversy on the scale seen in Clark County. ENVIRON therefore, has selected the strong points of California's programs as a marker for comparison.

Characteristics of Effective Programs - Offset programs should operate such that any emission reduction credits that are generated meet the five criteria listed in federal law, which is a cornerstone of the California program. ERCs should be based on emission reductions that are:

- "Real" - the emissions actually occurred. They were not permitted or allowed emissions that occurred only on paper.

- "Quantifiable" – the amount of emissions can be determined with reasonable certainty using source tests, or operating records combined with good quality emission factors.

- "Surplus" – reductions were not otherwise required or encumbered by any local, state or federal law, regulation, order or requirement.

- "Permanent" – the benefits of the reductions do not diminish or disappear during the time period for which the credits are good used.

- "Enforceable" – the reductions can be checked or verified at any time by field inspection or source testing.

Recommendations Regarding Clark County ERC Program - While it is beyond the scope of this study to do a detailed audit of Section 12.4.5 offset programs, the two road paving credit options and the urban forestry option have structural deficiencies that appear too serious to be bridged. A well-designed road paving program can be a viable SIP control measure for reducing fugitive dust emissions, but road paving is not well suited for offset programs. The inherent difficulty of quantifying benefits with the precision needed for credible ERCs is too much to overcome. Fee-for-offset programs have been tried in California, but phased out because they lost credibility. It was found that they did not produce consistent benefits, and were administratively complex and difficult to enforce. These measures have proven to be lightening rods for public criticism and litigation in Clark County. The are an administrative burden the CCHD has so far been unable to handle consistently. Tree planting credits have similar serious deficiencies.

The goals of Section 12.4.5 could be met by restructuring the offset program to apply Section 58 style credits to non-major sources of target pollutants. Road-paving and tree planting options can be discontinued with little if any loss of benefits, while lowering the CCHD's administrative burden, saving considerable resources, and reducing controversy and criticism. Fugitive dust reduction goals can be met more efficiently by strong effective permitting that places a premium on best available control practices, in combination with state-of the art SIP rules that have verifiable benefits.

Area Sources

PM_{10} emissions from area sources of fugitive dust must be controlled through the imposition of additional control measures in order to bring the Las Vegas Valley into attainment with the PM_{10} NAAQS. Additional local control measures were adopted in June 2000 that will regulate many of these sources. These measures will impact disturbed vacant areas, unpaved parking lots, unpaved and paved roads, and construction sites. No measures are currently under consideration for the reduction of oxide of nitrogen (NOx), or volatile organic compound (VOC) emissions.

The recently adopted fugitive dust control measures are discussed and evaluated below. Also included is an evaluation of revised versions of those measures that would improve effectiveness, reduce costs, or both.

Disturbed Vacant Areas - The Clark County Health District recently adopted regulations to control fugitive dust emissions from open areas and vacant lots. Under the regulation, the owner of any vacant lot greater than 0.11 acres in size that contains disturbed land in excess of 500 square feet in area must stabilize the soil surface. If the disturbance is due to vehicle use on the property, the owner is required to prevent trespass by installing barriers, signs, or other effective traffic control measures. Traffic control measures are not required if vehicle use is related to the noncommercial or noninstitutional use of the property by the owner. A stabilized soil surface is defined as one that satisfies one of several different soils tests.

Disturbed vacant lands are the most significant uncontrolled source of fugitive dust emissions in the Las Vegas Valley. Such lands are immediately adjacent to four of the five monitoring sites that record violations of the 24-hour PM_{10} standard, and are far closer than other

significant fugitive dust sources such as unpaved roads, paved roads, and mineral processing stationary sources.

The rule, if enforced, can provide substantial benefit to air quality. Because of the great number of vacant parcels throughout the Las Vegas Valley, effective enforcement of this rule will constitute a significant challenge to current and future regulatory agencies. Without enforcement, however, attainment of the PM_{10} ambient air quality standard will be very problematical.

As with most of the recently adopted fugitive dust rules, achieving a stable surface on lands affected by the rule is to be determined by specified soil tests. Each of these tests calls for the random selection of locations within the vacant area to be tested. Since each test calls for three small locations to be tested, and the disturbed surface can readily be less than 10% of the total area of the subject parcel, probabilities are high that many parcels will be deemed stable when in fact they contain disturbed areas sufficient to cause violations on the air quality standard in high wind conditions. The soil stability test methods should be revised to eliminate the random selection of testing sites, and instead should require that testing be conducted on the most disturbed portions of a parcel as identified by visual inspection.

A second problem with the proposed stability test methods is that they are time intensive and cannot be used by inspectors to efficiently determine compliance. Studies should be conducted in the Las Vegas Valley to identify a screening test method that is quick, repeatable, and inexpensive. One potential candidate for testing is the use of a leaf-blower to scan for disturbed areas or unstable soil surfaces that exceed pre-determined opacity thresholds.

Natural precipitation is effective in stabilizing soil surfaces only if the surfaces – once consolidated – are not disturbed. Thus, the enforcement policies should emphasize that if vehicular use or trespass on a vacant parcel is adequately prevented, periodic inspections or stability testing would not be required. Conversely, if continued vehicle use or trespass occurs, the enforcing agency should require periodic stability testing to demonstrate that windblown fugitive dust emissions are being sufficiently controlled.

Although the urbanized area of Las Vegas is surrounded by vacant desert land, it is not necessary to enforce this type of trespass and treatment regulation over all of these lands in order to attain the PM_{10} NAAQS. In a study of PM_{10} sources in the Las Vegas Valley, the Desert Research Institute concluded that PM_{10} concentrations were up to four times higher at monitoring sites within 0.5 kilometers (0.3 miles) of a fugitive dust source than at monitoring sites not as close to such sources.[3] As a result, the application of vacant land controls on those lands lying within 0.5 kilometers of established residential or commercial areas should be established as an enforcement priority, and enforcement on lands less proximate should be conducted in a second phase of rule implementation.

Detailed descriptions and evaluations of two control options for fugitive dust from disturbed vacant areas are presented below. The first option relies on the fencing of vacant lands while the second relies on the construction of relatively high (approximately two foot) earthen berms

[3] Fugitive Dust and Other Source Contributions to PM_{10} in Nevada's Las Vegas Valley, Volume II - Final Report, prepared for Clark County Department of Comprehensive Planning by Desert Research Institute, April 1997.

around each site. As discussed below, both measures would be effective in reducing PM_{10} emissions with the earthen berm option being the more cost-effective based on the assumptions used in this evaluation.

MEASURE TITLE: SECTION 90 - FUGITIVE DUST FROM OPEN AREAS AND VACANT LOTS
CONTROL OPTION: Installation of Fencing
CATEGORY TYPE: Fugitive Dust Program

NARRATIVE DESCRIPTION

The Clark County Health District has recently adopted a regulation prohibiting vehicle access and the stabilization of soil surfaces on vacant lots. Soil stabilization must be demonstrated using specified test methods. Vacant lots that are not used for commercial or institutional parking, and those smaller than 0.11 acres with disturbed areas smaller than 500 square feet, would be exempt from regulation. Vacant lots qualifying for control under this regulation must prevent trespass by installing effective traffic control measures such as fencing, signs, etc.

METHODOLOGY FOR ANALYSIS

Emissions
Pre- and post-control peak day emissions factors were computed from the microinventory emissions and land area subtotals for unstable and stable lands surrounding the East Craig monitoring site as reported in the draft microinventory study.[1] Peak day emissions factors were converted to annual emissions factors using the ratio of annual to peak day windblown dust emissions rates reported for vacant disturbed lands in the 1997 PM_{10} attainment plan.[2] The peak-day emission calculation assumes that 9.3% of all vacant lands are disturbed, that all vacant lands will be fenced to prevent vehicle trespass, and that windblown emissions will be reduced only from unstable vacant lands.

Cost
The cost of fence construction was estimated from construction cost estimates.[3] Construction costs were converted to annualized costs assuming a useful life of 15 years and an interest rate of 5%.

[1]Draft PM_{10} Emission Inventory of Sources Surrounding Five Ambient Monitoring Sites in the Las Vegas Valley, prepared for Clark County Department of Comprehensive Planning by Dames & Moore, March 2000
[2]Particulate Matter (PM_{10}) Attainment Demonstration Plan, Las Vegas Valley Non-attainment Area, Clark County, Nevada, Clark County Department of Comprehensive Planning, August 1997
[3]Best Management Practices Manual for Dust Control by Soil Type, prepared for Clark County Health District by Dames & Moore, April 2000.

RESULTS

Emissions
Emission reductions of 0.58 ton/acre-year from vacant lands overall are expected for PM_{10} emissions from this rule.

Cost ($/ton PM_{10})
The cost-effectiveness of fencing all vacant lands is $2,287 per ton of PM_{10} emission reduction.

Technical Implementation Feasibility and Ranking
This measure is technically feasible on all unimproved vacant parcels. Lots receiving annual weed abatement services will need appropriate gating to accommodate abatement vehicles.

The control effectiveness of this measure as written will be low because:

- The protocol for testing of soil stability at three randomly-selected sites on a parcel will fail to identify a number of parcels on which 10% or less of the surface area is disturbed, an area sufficient to produce significant emissions of windblown fugitive dust, and
- The current enforcement staffing levels within the Clark County Health District are too low to adequately inspect and confirm the results of stability testing or vehicle trespass prevention.

To resolve these problems, testing should be conducted on the most disturbed portions of parcels as identified by visual inspection, and enforcement staffing levels should be increased to adequately accommodate the proposed increase in workload.

RESPONSIBLE AGENCY FOR IMPLEMENTATION
This measure will require adoption by Clark County Health District.
POLITICAL/SOCIAL/PUBLIC ACCEPTANCE
The initial installation and maintenance of fencing will be expensive, especially on those lots with high aspect ratios (long and narrow).

MEASURE TITLE: SECTION 90 - FUGITIVE DUST FROM OPEN AREAS AND VACANT LOTS
CONTROL OPTION: Earth Berm Along Edge of Open Area
CATEGORY TYPE: Fugitive Dust Program

NARRATIVE DESCRIPTION

The Clark County Health District recently adopted a regulation prohibiting vehicle access and the stabilization of soil surfaces on vacant lots. An alternative method for controlling vehicle access is through the construction of earth berms along the boundaries of vacant lots. Soil stabilization must be demonstrated using specified test methods. Vacant lots that are not used for commercial or institutional parking, and those smaller than 0.11 acres with disturbed areas smaller than 500 square feet, would be exempt from regulation.

METHODOLOGY FOR ANALYSIS

Emissions
Pre- and post-control peak day emissions factors were computed from the microinventory emissions and land area subtotals for unstable and stable lands surrounding the East Craig monitoring site as reported in the draft microinventory study.[1] Peak day emissions factors were converted to annual emissions factors using the ratio of annual to peak day windblown dust emissions rates reported for vacant disturbed lands in the 1997 PM_{10} attainment plan.[2] The peak day emission calculation assumes that 9.3% of all vacant lands are disturbed, that all vacant lands will be bermed to prevent vehicle trespass, and that windblown emissions will be reduced only from unstable vacant lands.

Cost
The cost of berm construction was estimated from equipment cost estimates[3] and general estimates of construction time. Construction costs were converted to annualized costs assuming a useful life of 2 years and an interest rate of 5%.

[1]Draft PM_{10} Emission Inventory of Sources Surrounding Five Ambient Monitoring Sites in the Las Vegas Valley, prepared for Clark County Department of Comprehensive Planning by Dames & Moore, March 2000
[2]Particulate Matter (PM_{10}) Attainment Demonstration Plan, Las Vegas Valley Non-attainment Area, Clark County, Nevada, Clark County Department of Comprehensive Planning, August 1997
[3]Best Management Practices Manual for Dust Control by Soil Type, prepared for Clark County Health District by Dames & Moore, April 2000

RESULTS

Emissions
Emission reductions of 0.054 ton/acre-year from vacant lands overall are expected for PM_{10} emissions from this rule.

Cost ($/ton PM_{10})
The cost-effectiveness of berming all vacant lands and stabilizing disturbed portions with a single water application every two years is $231 per ton of PM_{10} emission reduction.

Technical Implementation Feasibility and Ranking
This measure is technically feasible on all unimproved vacant parcels except those that are narrower than the turning diameter of a typical motor grader (50 feet). Maintenance of earth berms may interfere with weed abatement on lots receiving this service.

The control effectiveness of this measure as written will be low because:

- The protocol for testing of soil stability at three randomly-selected sites on a parcel will fail to identify a number of parcels on which 10% or less of the surface area is disturbed, an area sufficient to produce significant emissions of windblown fugitive dust, and
- The current enforcement staffing levels within the Clark County Health District are too low to adequately inspect and confirm the results of stability testing or vehicle trespass prevention.

To resolve these problems, testing should be conducted on the most disturbed portions of parcels as identified by visual inspection, and enforcement staffing levels should be increased to adequately accommodate the proposed increase in workload.

RESPONSIBLE AGENCY FOR IMPLEMENTATION
The Clark County Health District would need to adopt this measure.
POLITICAL/SOCIAL/PUBLIC ACCEPTANCE
This measure would be the lowest cost solution to vacant lot stabilization. The owners of small lots would not realize the economies of scale in contracting directly with construction contractors to have berms installed. Such costs could be reduced by having local jurisdictions offer this service through franchise contractors much as mandatory weed abatement services are provided by some municipalities.

Unpaved Roads - A measure controlling fugitive dust emissions from unpaved roads, unpaved alleys, and unpaved easements has also been recently adopted by the Health District. This would requires that the owner of each unpaved road either pave or treat the road surface with sufficient dust suppressant to satisfy one of three stabilization standards. Non-commercial and non-institutional private driveways are exempt from regulation.

The unpaved road stabilization standards include tests for opacity, surface silt loading, and surface silt percentage. The opacity limit is 20% and is measured at the trailing edge of a vehicle passing in front of the observer. The surface silt loading, which represents the quantity of fine soil passing a 200 mesh screen, is limited to 0.33 ounces per square foot and is measured with a hand-shaken stack of sieve screens and a scale. The surface silt percentage limit is 6% of total surface soil weight, and is calculated from the results of the surface silt loading test. To be certified stable, a road must comply with the opacity limit and either the surface silt loading limit or the surface silt percentage limit.

A problem with the opacity testing method is that the test may be conducted at any vehicle speed. Although the EPA emission factor equation for unpaved roads does not list speed as a predictive variable, some of the underlying studies supporting the EPA factor show speed to be a significant variable in dry desert climates.[4] The absence of a minimum speed requirement in the opacity test protocol would allow the test to be run with vehicles operating at speeds of less than 5 miles per hour, a speed at which little or no visible plume would be produced. This omission should be corrected by setting a minimum travel speed for test purposes. Field testing of the relationship between vehicle speed and opacity on dry soil should also be conducted to determine the minimum speed for opacity testing.

Unpaved roads are listed in Clark County emission inventories as the fourth largest source of PM_{10} emissions, behind construction activities, disturbed vacant lands, and paved road dust. The prevalence of unpaved roads near nonattainment monitoring sites has also been found to be very low.[5] As a result, the control measure for unpaved roads does not need to achieve the same level of emission reduction as is needed from disturbed vacant land, for example. Because the methods of determining unpaved road stability are somewhat time intensive, a testing program should be considered to assess whether a simpler test procedure will provide a satisfactory indication of road stability. If, for example, opacity readings are found in field tests to correlate adequately with surface soil loading or percentage indices, then opacity readings alone could be used to assess stability, simplifying and expediting compliance evaluation procedures.

As discussed below, the implementation of the dust control measure described below for unpaved roads appears to provide the potential for reducing PM_{10} emissions cost-effectively.

[4] Unpaved Road Emission Impact, Arizona Department of Environmental Quality, March 1991.
[5] Draft PM_{10} Emission Inventory of Sources Surrounding Five Ambient Monitoring Sites in the Las Vegas Valley, prepared for Clark County Health District by Dames & Moore, February 2000.

MEASURE TITLE: SECTION 91 - FUGITIVE DUST FROM UNPAVED ROADS, UNPAVED ALLEYS, AND UNPAVED EASEMENTS
CATEGORY TYPE: Fugitive Dust Program

NARRATIVE DESCRIPTION

The Clark County Health District recently adopted a regulation requiring that unpaved roads and other traveled ways be stabilized either by paving or the application of dust suppressants. Stabilization must be demonstrated using specified test methods.

METHODOLOGY FOR ANALYSIS

Emissions
Pre- and post-control emissions factor were computed from the AP-42 equation for unpaved roads. The average pre-control surface silt content was assumed to be 16%, the average vehicle weight was assumed to be 3.0 tons per vehicle, and the average vehicle count was assumed to be 30 vehicles per day.[1] The annual average surface moisture content was assumed to be 1.46%.[2] The average post-control surface silt content was assumed to be 6%, the upper limit allowed under the regulation.

Cost
The cost of initial aggregate placement was estimated to be $11,000 per mile.[2] Placement costs were converted to annualized costs assuming a useful life of 10 years[3] and an interest rate of 5%. Annual maintenance of the road surface was estimated to include regrading and the application of one inch of aggregate every two years. Grading was estimated to cost $80 per hour, and aggregate material cost was estimated to be $17 per cubic yard.[4]

[1]Draft PM_{10} Emission Inventory of Sources Surrounding Five Ambient Monitoring Sites in the Las Vegas Valley, prepared for Clark County Department of Comprehensive Planning by Dames & Moore, March 2000
[2]SUMDATA.PDF spreadsheet, developed by U.S. Environmental Protection Agency to accompany AP-42 Section 13.2.2, Unpaved Roads, 9/98
[3]Best Management Practices Manual for Dust Control by Soil Type, prepared for Clark County Health District by Dames & Moore, April 2000.
[4]Construction Costs 1996, Arizona Department of Transportation, Highways Division.

RESULTS

Emissions
Emission reductions of 5.37 tons of PM_{10} per mile of unpaved road are expected from implementation of this measure.

Cost ($/ton PM_{10})
The cost-effectiveness of applying and maintaining sufficient gravel to reduce the surface silt content of unpaved roads to 6% on a continuous basis is estimated to be $901 per ton of PM_{10} emission reduction. This cost-effectiveness is based on an average daily traffic rate of 30 vehicles per day.

Technical Implementation Feasibility and Ranking
This measure is technically feasible on all unpaved roads, unpaved alleys, and unpaved easements. Gravel replenishment rates will be higher on unpaved road sections that carry precipitation runoff as a result of inadequate drainage.

The control effectiveness of this measure will be limited by the ability of Clark County Health District enforcement staff to adequately inspect and confirm stability testing of roadway surfaces from all of the unpaved roads treated by control methods other than paving. To increase control effectiveness, enforcement staffing levels within the Health District should be adequately increased to accommodate the increased workload, and a simpler screening method for assessing roadway surface stability should be developed for use by enforcement inspectors.

RESPONSIBLE AGENCY FOR IMPLEMENTATION
The Clark County Health District would need to adopt this measure.
POLITICAL/SOCIAL/PUBLIC ACCEPTANCE
The initial application of aggregate to unpaved roads will be expensive, especially to the owners of roads of extended length on commercial or institutional land. Agencies of the United States Government, such as the Bureau of Reclamation and the Department of Defense, may not have budget funds available within the regulatory implementation period to complete this work.

Unpaved Parking Lots - This measure requires the owner of any unpaved parcel used for vehicle parking to pave or apply dust suppressants to the surface of the parking area. Unpaved parcels used for parking that are smaller than 0.11 acres in size would be exempt from regulation. The standards for assuring surface stability, like those for unpaved roads, are based on opacity, surface silt loading, or surface silt percentage.

The tests for opacity, surface silt loading, and surface silt percentage are identical to those prescribed for verifying the stability of unpaved roads. The opacity limit is 20% and is measured at the trailing edge of a vehicle passing in front of the observer. The surface silt loading, which represents the quantity of fine soil passing a 200 mesh screen, is limited to 0.33 ounces per square foot and is measured with a hand-shaken stack of sieve screens and a scale. The surface silt percentage limit is 8% of total surface soil weight, and is calculated from the results of the surface silt loading test. To be certified stable, a parking surface must comply with the opacity limit and either the surface silt loading limit or the surface silt percentage limit.

Although unpaved parking lots are not identified in the PM_{10} attainment plan as a separate source, the recently conducted microinventory of nonattainment monitoring sites indicates that emissions from these parcels are greater than those of unpaved roads. This is logical as the traffic levels on unpaved roads are low in the Las Vegas Valley, and higher emissions are generated on peak design days by the entrainment of loose dust on roadway surfaces by gusting wind that is generated by the passage of vehicles. Because unpaved parking areas typically encompass larger expanses of disturbed soil surfaces than are exposed by unpaved roads within any portion of the urbanized area of the Valley, these parking areas should receive greater attention and control. As with disturbed vacant lands where continued vehicle access is allowed, this measure should include a specification for the frequency with which surface stabilization tests are to be conducted to assure continuous compliance.

Two potential control options, one involving parking lot paving and the other the use of aggregate as a surface covering were assessed. The paving option is the more costly of the two but also yields the largest emission reductions. Both options appear to be relatively cost-effective.

MEASURE TITLE: SECTION 92 - FUGITIVE DUST FROM UNPAVED PARKING LOTS
CONTROL OPTION: Paving of Soil Surface with Asphalt Concrete
CATEGORY TYPE: Fugitive Dust Program

NARRATIVE DESCRIPTION

The Clark County Health District recently adopted a regulation requiring that unpaved parking lots greater than 0.11 acres in size be paved or treated with dust suppressants. Parking lots treated with dust suppressants would be required to satisfy surface stability requirements. These requirements include a limit of 20% opacity on visible emissions from vehicles traveling over a parking lot, and surface silt limits of either 0.33 ounces per square foot or 8% of total surface soil weight.

METHODOLOGY FOR ANALYSIS

Emissions

Vehicle movement and windblown dust emissions were computed separately. For vehicle movements, pre- and post-control emissions factor were computed from the AP-42 equations for unpaved and paved roads. The average pre-control surface silt content was assumed to be 12%, the average vehicle weight was assumed to be 3.0 tons per vehicle, and the average vehicle count was assumed to be 30 vehicles per day.[1] The annual average surface moisture content was assumed to be 1.46%.[2] The average post-control surface silt loading was assumed to 5.1 grams per square meter, representing the average silt loading of local roads in the Las Vegas Valley.

For windblown dust emissions, pre-control peak day emissions factors were computed from the microinventory emissions and land area subtotals for unstable lands surrounding the East Craig monitoring site as reported in the draft microinventory study.[1] Peak day emissions factors were converted to annual emissions factors using the ratio of annual to peak day windblown dust emissions rates reported for vacant disturbed lands in the 1997 PM_{10} attainment plan.[3] For post-control paved surfaces, windblown dust emissions were assumed to be zero.

Cost

The cost of initial paving was estimated to be $20,625 per acre.[4] Placement costs were converted to annualized costs assuming a useful life of 10 years[4] and an interest rate of 5%. Annual maintenance of the parking surface was estimated to include the application of a seal coat after 10 years of use. This coating was assumed to cost $9,500 per acre and have a useful life of 10 years.[5]

[1]Draft PM_{10} Emission Inventory of Sources Surrounding Five Ambient Monitoring Sites in the Las Vegas Valley, prepared for Clark County Department of Comprehensive Planning by Dames & Moore, March 2000
[2]SUMDATA.PDF spreadsheet, developed by U.S. Environmental Protection Agency to accompany AP-42 Section 13.2.2, Unpaved Roads, 9/98
[3]Particulate Matter (PM_{10}) Attainment Demonstration Plan, Las Vegas Valley Non-attainment Area, Clark County, Nevada, Clark County Department of Comprehensive Planning, August 1997
[4]Best Management Practices Manual for Dust Control by Soil Type, prepared for Clark County Health District by Dames & Moore, April 2000
[5]Construction Costs 1996, Arizona Department of Transportation, Highways Division

RESULTS

Emissions

Emission reductions of 1.39 tons of PM_{10} per acre of unpaved parking lot are expected from implementation of this measure.

Cost ($/ton PM_{10})

The cost-effectiveness of applying and maintaining a paved surface is estimated to be $1,757 per ton of PM_{10} emission reduction. This cost-effectiveness is based on an average daily parking rate of 30 vehicles per acre per day.

Technical Implementation Feasibility and Ranking

This measure is technically feasible for all unpaved parking lots.

RESPONSIBLE AGENCY FOR IMPLEMENTATION
This measure would require adoption by the Clark County Health District.
POLITICAL/SOCIAL/PUBLIC ACCEPTANCE
The initial paving of unpaved parking lots will be expensive, especially for large areas used for parking.

MEASURE TITLE: SECTION 92 - FUGITIVE DUST FROM UNPAVED PARKING LOTS
CONTROL OPTION: Covering of Soil Surface with Aggregate
CATEGORY TYPE: Fugitive Dust Program

NARRATIVE DESCRIPTION

The Clark County Health District recently adopted a regulation requiring that unpaved parking lots greater than 0.11 acres in size be paved or treated with dust suppressants, such as aggregate. Parking lots treated with dust suppressants would be required to satisfy surface stability requirements. These requirements include a limit of 20% opacity on visible emissions from vehicles traveling over a parking lot, and surface silt limits of either 0.33 ounces per square foot or 8% of total surface soil weight.

METHODOLOGY FOR ANALYSIS

Emissions
Pre- and post-control emissions factor were computed from the AP-42 equation for unpaved roads. The average pre-control surface silt content was assumed to be 12%, the average vehicle weight was assumed to be 3.0 tons per vehicle, and the average vehicle count was assumed to be 30 vehicles per day.[1] The annual average surface moisture content was assumed to be 1.46%.[2] The average post-control surface silt content was assumed to be 6%, the upper limit allowed under the regulation.

Cost
The cost of initial aggregate placement was estimated to be $7,000 per acre.[3] Placement costs were converted to annualized costs assuming a useful life of 10 years[3] and an interest rate of 5%. Annual maintenance of the parking surface was estimated to include regrading and the application of one inch of aggregate every five years. Grading was estimated to cost $80 per hour, and aggregate material cost was estimated to be $17 per cubic yard.[4]

[1]Draft PM_{10} Emission Inventory of Sources Surrounding Five Ambient Monitoring Sites in the Las Vegas Valley, prepared for Clark County Department of Comprehensive Planning by Dames & Moore, March 2000
[2]SUMDATA.PDF spreadsheet, developed by U.S. Environmental Protection Agency to accompany AP-42 Section 13.2.2, Unpaved Roads, 9/98
[3]Best Management Practices Manual for Dust Control by Soil Type, prepared for Clark County Health District by Dames & Moore, April 2000
[4]Construction Costs 1996, Arizona Department of Transportation, Highways Division

RESULTS

Emissions
Emission reductions of 0.99 tons of PM_{10} per acre of unpaved parking lot are expected from implementation of this measure.

Cost ($/ton PM_{10})
The cost-effectiveness of applying and maintaining sufficient gravel to reduce the surface silt content of unpaved roads to 6% on a continuous basis is estimated to be $1,423 per ton of PM_{10} emission reduction. This cost-effectiveness is based on an average daily traffic rate of 30 vehicles per acre per day.

Technical Implementation Feasibility and Ranking
This measure is technically feasible on all unpaved parking lots.

The control effectiveness of aggregate placement and maintenance will be limited by enforcement activity levels. At current enforcement staffing levels within the Clark County Health District, unpaved parking areas will be not inspected with sufficient frequency to ensure long-term compliance with the stability standards. To increase control effectiveness, enforcement staffing levels should be adequately expanded to accommodate the increased workload, and more time-efficient screening methods should be developed for use by inspectors in determining compliance with stability standards.

RESPONSIBLE AGENCY FOR IMPLEMENTATION
This measure would require adoption by the Clark County Health District.
POLITICAL/SOCIAL/PUBLIC ACCEPTANCE
The initial application of aggregate to unpaved parking area will be expensive, especially for large parking areas.

Paved Roads - This measure will reduce PM_{10} emissions from paved road use by requiring that streets have paved or graveled shoulders to reduce the migration of soil onto paved travel lanes. The measure requires that streets carrying more than 3,000 vehicles per day have eight foot paved shoulders and that streets carrying more than 500 but less than 3,000 vehicles per day have four foot paved shoulders bordered by four foot graveled sections. All new streets are required to meet the standards prior to opening, and existing streets are required to be modified on a 20-year schedule.

The adequacy of graveled sections to prevent soil migration onto traveled ways will be certified through compliance with one of several surface stability standards. These standards are similar to those established for unpaved roads and parking areas: an opacity limit of 20% and a surface silt loading limit of 0.33 ounces per square foot. To be certified as stable, a graveled shoulder must comply with the opacity limit and the surface silt loading limit.

The measure also requires that new street sweepers purchased or operated under contract comply with certification standards developed by the South Coast Air Quality Management District (Los Angeles, California). These standards limit the emissions of PM_{10} from a street sweeper during operation, and impose a minimum removal efficiency of loose soil from street surfaces.

The analysis of the proposed measure presented below shows that it will generate significant PM_{10} emission reductions on both high and moderate volume roadways in what appears to be a relatively cost-effective manner.

MEASURE TITLE: SECTION 93 - FUGITIVE DUST FROM PAVED ROADS AND STREET SWEEPING EQUIPMENT
CONTROL OPTION: Paving of Four-Foot Shoulder
CATEGORY TYPE: Fugitive Dust Program

NARRATIVE DESCRIPTION

The Clark County Health District recently adopted a regulation requiring that existing unpaved road shoulders be paved or treated to a width of 4 feet.

METHODOLOGY FOR ANALYSIS

Emissions
Pre- and post-control emissions factors were computed from the AP-42 equation for paved roads. The average post-control surface silt loading was assumed to be 1.69 grams per square meter, which represents the mean of silt loading measurements made on local roads in Las Vegas.[1] The ratio of silt loadings from roads with paved shoulders to those without is estimated to be 0.42, the ratio found in the Phoenix urban area for arterial streets.[2] The average vehicle weight was assumed to be 3.0 tons per vehicle.[3] Traffic levels were assumed to be 150 vehicles per day, the minimum level at which unpaved roads are required to be paved with paved or treated shoulders and the level that results in a worst case assessment of cost-effectiveness.

Cost
The cost of initial paving of 4-foot shoulders was estimated to be $18,439 per centerline mile, although higher costs have been estimated.[5] Initial paving costs were converted to annualized costs assuming a useful life of 20 years[4] an d an interest rate of 5%.

[1]Final Report Silt Loading Measurements for Clark County Paved Roads Submitted To: Clark County Regional Transportation Commission by Dames & Moore, March 2000
[2]Particulate Control Measure Feasibility Study, Vol. II: Emissions; prepared for Maricopa Association of Governments by Sierra Research, August 1996
[3]Draft PM_{10} Emission Inventory of Sources Surrounding Five Ambient Monitoring Sites in the Las Vegas Valley, prepared for Clark County Department of Comprehensive Planning by Dames & Moore, March 2000
[4]Best Management Practices Manual for Dust Control by Soil Type, prepared for Clark County Health District by Dames & Moore, April 2000
[5]Construction Costs 1996, Arizona Department of Transportation, Highways Division

RESULTS

Emissions
Emission reductions of 0.30 tons of PM_{10} per centerline mile of local road are expected from implementation of this measure.

Cost ($/ton PM_{10})
The cost-effectiveness of applying and maintaining a paved surface is estimated to be $5,008 per ton of PM_{10} emission reduction. This cost-effectiveness is based on an average daily traffic rate of 150 vehicles per day.

Technical Implementation Feasibility and Ranking
This measure is technically feasible for all streets with unpaved shoulders.

RESPONSIBLE AGENCY FOR IMPLEMENTATION

This measure would require adoption by the Clark County Health District.

POLITICAL/SOCIAL/PUBLIC ACCEPTANCE

The initial paving of unpaved road shoulders will be expensive.

MEASURE TITLE: SECTION 93 - FUGITIVE DUST FROM PAVED ROADS AND STREET SWEEPING EQUIPMENT
CONTROL OPTION: Application of Aggregate on Four-Foot Road Shoulder
CATEGORY TYPE: Fugitive Dust Program

NARRATIVE DESCRIPTION

The Clark County Health District is proposing to adopt a regulation requiring that existing unpaved road shoulders be paved or treated to a width of 4 feet.

METHODOLOGY FOR ANALYSIS

Emissions
Pre- and post-control emissions factors were computed from the AP-42 equation for paved roads. The average post-control surface silt loading was assumed to be 1.69 grams per square meter, which represents the mean of the silt loading measurements made by on local roads in Las Vegas.[1] The ratio of silt loadings from roads with treated shoulders to those without is estimated to be 0.42, the ratio found in the Phoenix urban area for arterial streets.[2] The average vehicle weight was assumed to be 3.0 tons per vehicle.[3] Traffic levels were assumed to be 150 vehicles per day, the minimum level at which unpaved roads are required to be paved with treated shoulders and the level that results in the worst case cost-effectiveness.

Cost
The cost of applying aggregate to 4 foot shoulders was estimated to be $4,433 per centerline mile.[5] Initial improvement costs were converted to annualized costs assuming a useful life of 20 years[3] and an interest rate of 5%.

[1]Final Report Silt Loading Measurements for Clark County Paved Roads Submitted To: Clark County Regional Transportation Commission, March 2000
[2]Particulate Control Measure Feasibility Study, Vol. II: Emissions; prepared for Maricopa Association of Governments by Sierra Research, August 1996
[3]Draft PM_{10} Emission Inventory of Sources Surrounding Five Ambient Monitoring Sites in the Las Vegas Valley, prepared for Clark County Department of Comprehensive Planning by Dames & Moore, March 2000
[4]Best Management Practices Manual for Dust Control by Soil Type, prepared for Clark County Health District by Dames & Moore, April 2000
[5]Construction Costs 1996, Arizona Department of Transportation, Highways Division

RESULTS

Emissions
Emission reductions of 0.30 tons of PM_{10} per centerline mile of local road are expected from implementation of this measure.

Cost ($/ton PM_{10})
The cost-effectiveness of applying and maintaining a paved surface is estimated to be $1,943 per ton of PM_{10} emission reduction. This cost-effectiveness is based on an average daily traffic rate of 150 vehicles per day.

Technical Implementation Feasibility and Ranking
This measure is technically feasible for all streets with unpaved shoulders.

RESPONSIBLE AGENCY FOR IMPLEMENTATION

This measure would require adoption by the Clark County Health District.

POLITICAL/SOCIAL/PUBLIC ACCEPTANCE

The initial aggregate placement on unpaved road shoulders will be expensive.

Construction Activity Permits and Controls -The Clark County Health District recently adopted a regulation to control fugitive dust emissions from construction activities. Section 94 will require construction projects and other dust generating activities to acquire dust control permits, and larger projects to develop approvable dust mitigation plans. Permits and plans must address each source of dust generation, and must apply one or more Best Management Practices to each source. Best Management Practices are identified in a Section 94 Handbook adopted by reference in the rule.

Because a number of source activities are regulated by this rule, because alternative control methods may be implemented at the discretion of the construction manager, and because the control effectiveness of many of these alternatives measures will depend significantly on the degree of enforcement applied by the Clark County Health District, computing pre- and post-control overall emissions rates from construction activities is difficult and somewhat speculative.

Since the mid-1990s, significant progress has been made by the Health District in reducing fugitive dust emissions from construction activities. The adoption of a best management practices manual and the requirement for dust mitigation plans for larger projects will further increase the effectiveness of this regulatory program. The only deficiency in this approach will be having an adequate number of trained staff within the District to process the more extensive project applications that would be required by this measure. The one staff person processing applications and issuing dust mitigation permits will not be able to manage the increased workload imposed by this measure.

The Best Management Practices manual specifies in detail alternative controls that can be implemented to mitigate construction activities in soils of varying emission potentials. These controls are primarily equipment and practice standards specific to a number of separate construction activities. Standards of increasing effectiveness are associated with soil types of increasing emission potential.

This measure places into regulation some control measures that have only been enforced as permit conditions previously. The incorporation of these minimum standards into regulatory form means that they will no longer be discretionary with the District staff issuing permits but, instead, will become obligatory for every applicable project. This change will increase the consistency of regulatory application and make field enforcement more efficient.

VOC and NOx Control Measures - Turning to the issue of potential additional control measures for VOC and NOx emissions from area sources, the limitations associated with the area source emissions inventory and uncertainties associated with enforcement of existing controls again preclude any meaningful evaluation of the emission benefits or costs of additional measures. However, as is the case with respect to stationary sources, there are a number of general measure categories that should be evaluated once the limitations described above have been remedied

Clark County has no rules that specifically limit VOC emissions from the following area sources: emulsified asphalt, marine coating operations, pleasure craft coating operations, coating of metal parts, architectural coatings, aerosol coatings, graphic arts, screen printing operations, restaurant charbroilers, commercial bakery ovens, decontamination of soil, and charcoal igniter agents. Regulations targeting emissions from these sources have been

evaluated, determined to be cost-effective, and implemented in other areas. However, as both the form, stringency, emission benefits and costs associated with rules targeting these sources can vary from area to area, they need to be assessed specifically for the Las Vegas Valley. Similarly with respect to NOx emissions, Clark County has no rules that specifically limit NOx emissions from the following area sources: natural-gas-fired, fan-type central furnaces; asphalt pavement heaters; and residential natural-gas-fired water heaters. Again, rules targeting emissions from these sources have been evaluated, determined to be cost-effective, and implemented in other areas, but must be evaluated specifically for the Las Vegas Valley when it is practical to do so.

POTENTIAL ADDITIONAL CONTROL MEASURES FOR ON- AND OFF-ROAD MOBILE SOURCES

Introduction

There are three basic ways in which emissions from mobile sources are regulated. The first approach seeks to reduce emissions from new vehicles and engines through the imposition of more stringent emission standards. Potential control measures identified and evaluated for implementation in the Las Vegas Valley that are based on this approach are:

- New federal Phase 2 emission standards for small gasoline engines used in off-road applications;
- Adoption of the California LEV II program for on-road vehicles;
- Accelerated purchase of low-emission diesel engines for off-road equipment;
- Electrification of airport ground support equipment; and
- Adoption of California emission regulations for large spark-ignition engines used in off-road equipment.

The second approach seeks to reduce emissions from vehicles and engines that are in-use by assuring that engines are in a proper state of maintenance, by retrofitting them with engines that have lower emission levels and/or additional emission control devices, or by decreasing the amount of time they operate. Potential measures identified and evaluated for implementation in the Las Vegas Valley based on this approach include:

- Improvements to the Clark County I/M program;
- Smoke inspections for on- and off-road diesel engines;
- Accelerated retirement of older on-road vehicles;
- Repowering of existing on-road heavy-duty diesel vehicles with cleaner engines;
- Retrofit of particulate traps on on- and off-road diesel vehicles;
- Retrofit of selective catalytic reduction systems on on-road diesel vehicles; and
- Transportation control measures reducing the operation of on-road vehicles.

In addition to the two approaches discussed above, the properties of the fuels used in new and in-use vehicles can be of considerable importance with respect to emissions. Fuels related control measures can involve specifying the composition of gasoline and diesel fuel as a means of reducing emissions from engines. In addition, another common type of fuel regulation is intended to force the conversion of engines from operation on gasoline or diesel fuel to operation on "cleaner" "alternative" fuels such as natural gas. Potential measures identified and evaluated for implementation in the Las Vegas Valley based on this approach include:

- Reducing summertime gasoline volatility;
- Requiring the use of California Phase 3 gasoline;
- Requiring the use of California diesel fuel;
- Requiring the use of "ultra-low" sulfur diesel fuels;
- Requiring the use of diesel fuel/water emulsions; and
- Requiring the purchase of new natural gas powered light-duty vehicles for use in fleet operations.

The control measures evaluated under each of these approaches are discussed below.

Measures Targeting Emissions from New Vehicles and Engines

Summaries of the evaluations of the measures considered are presented below. As the adoption of the federal Phase 2 engine standards has already occurred, no cost-effectiveness analysis is presented. This measure will result in small additional reductions in VOC and PM emissions and a small increase in CO emissions in the Las Vegas Valley.

As shown below, electrification of airport ground support equipment and the adoption of California regulations for large off-road spark-ignition engines would yield reductions in VOC, NOx, CO, and PM emissions in a cost-effective manner based the assumptions used in this analysis and on a comparison to the California benchmarks. In contrast, the adoption of the California LEV II program in Nevada does not appear to represent a cost-effective means of reducing emissions despite the use of very conservative (e.g. low) cost estimates for that program. Finally, because of uncertainties in the cost of the accelerated purchase of cleaner diesel engines for off-road equipment, it is unclear whether the emission reductions from this measure would provide would be cost-effective.

MEASURE TITLE: NEW FEDERAL PHASE 2 SMALL GASOLINE ENGINE STANDARDS
CATEGORY TYPE: Nonroad Programs

NARRATIVE DESCRIPTION

Recently EPA adopted revised Phase 2 emission standards for handheld small gasoline engines (EPA, March 1, 2000; found at http://www.epa.gov/oms/equip-ld.htm#regs). These standards will apply to small engines that are typically 2-stroke. The standards are expected to result in lower THC and PM emissions, and very slight increases NOx and CO (because more 4-stroke engines are expected to be used).

METHODOLOGY FOR ANALYSIS

Emissions
In order to determine the emission effects, EPA provided to ENVIRON the input files for the NONROAD model that were used to determine the benefits of this rulemaking. In this manner, we determined the expected benefit specifically for Clark county.

Cost
There is no additional cost over what is expected as a result of the federal rulemaking.

RESULTS

Emissions
Reductions in HC and PM are expected with these new emission standards because more 4-stroke and catalyst will be used with handheld equipment. However, the emissions from handheld are a small portion of the overall inventory, resulting in low overall emission reductions.

Percent Change with New Federal Phase 2 Small Engine Emission Standards.

Category	Pollutant	2005	2010	2015	2020
Construction	HC	-1	0	0	0
	CO	0	0	0	0
	NOx	0	0	0	0
	PM	0	0	0	0
Lawn & Garden	HC	-9	-3	-3	-3
	CO	-1	+1	+1	+1
	NOx	+1	+1	+1	+1
	PM	-4	-5	-5	-1
Commercial	HC	-5	-1	-1	-1
	CO	0	0	0	0
	NOx	0	0	0	0
	PM	-1	-1	-1	-1
Logging	HC	-1	0	0	0
	CO	0	0	0	0
	NOx	0	0	0	0
	PM	0	0	0	0

Ton Per Day (TPD) Reductions with Federal Phase 2 Small Engine Standards.

In-Use Year	Summer VOC (tpd)	Summer NOx (tpd)	Summer PM (tpd)	Winter CO (tpd)	Winter PM (tpd)
2005	-0.57	0.00	-0.01	-0.09	0.00
2010	-0.13	0.00	-0.01	0.09	0.00
2015	-0.13	0.00	-0.01	0.10	0.00
2020	-0.15	0.00	-0.01	0.11	0.00
2025	-0.16	0.00	-0.01	0.12	0.00

Cost-Effectiveness ($/ton)

RESPONSIBLE AGENCY FOR IMPLEMENTATION

U.S. EPA

MEASURE TITLE: IMPLEMENTATION OF CALIFORNIA LEV II EMISSION STANDARDS
CATEGORY TYPE: On-Road Motor Vehicle

NARRATIVE DESCRIPTION

Under this measure, the state of Nevada would adopt the California LEV II regulations. For this analysis, it was assumed that only light-duty cars and trucks (under 8,500 lbs. GVWR) would be included in the program. The California LEV II regulations go beyond the federal Tier 2 regulations, requiring 10% zero emission vehicles (ZEVs) for passenger cars and light trucks under 3,750 lbs. test weight in 2003 and subsequent model years. In addition, because the California regulations require compliance with fleet-average NMOG standards that are more stringent than the NOx-based Tier 2 standards, reductions in exhaust VOC are realized. Finally, the California regulations require the heavier light-duty trucks to comply with stringent NOx standards much sooner than the Tier 2 standards.

METHODOLOGY FOR ANALYSIS

Emissions
Emission reductions were estimated by first generating fleet-average emission rates for the baseline case (i.e., Tier 2 standards). The difference between the fleet-average LEV II standards and the federal Tier 2 standards was then determined. The ratio of these standards (by model year) was then applied to the model year specific baseline emission rates (2004 and later model years), and the fleet-average emission rate was re-computed. That difference was then applied to the inventory estimates previously developed for this project. Evaporative emissions and PM emissions were reduced in proportion to the fraction of ZEVs in each model year.

Cost
While a detailed cost analysis was outside the scope of this study, the cost differential between vehicles built to the Tier 2 standards and the LEV II standards was very conservatively (e.g. a low estimate) assumed to be $100 per vehicle for non-ZEVs and $10,000 per vehicle for ZEVs. For passenger cars, this results in an overall cost differential of $1,090 per vehicle (i.e., 10% ZEVs and 90% non-ZEVs).

RESULTS

Emissions
Emission reductions are expected for VOC, CO, NOx, and PM from this rule. The following reductions in on-road motor vehicle emissions are expected (VOC, NOx, and PM based on summer estimates; CO based on winter estimates):

	VOC	CO	NOx	PM
Calendar Year 2005	0.4%	0.3%	1.1%	0.2%
Calendar Year 2010	3.3%	1.4%	7.0%	0.7%
Calendar Year 2015	7.9%	2.8%	8.8%	0.9%
Calendar Year 2020	12.9%	3.5%	6.7%	1.0%
Calendar Year 2025	14.7%	3.6%	5.0%	1.0%

Cost-Effectiveness ($/ton)
The cost-effectiveness of this measure was determined by dividing the inventory reductions in 2025 (reflecting nearly complete fleet turnover) for light-duty autos by the total VMT attributable to light-duty autos. This resulted in an average reduction of 0.143 g/mi VOC, 0.037 g/mi NOx, 0.532 g/mi CO, and 0.46 mg/mi PM. Assuming the average vehicle has a lifetime of 125,000 miles, this measure results in lifetime emission reductions of 39.4 lbs. VOC, 147 lbs. CO, 10.2 lbs. NOx, and 0.13 lbs. PM. Using an average per-vehicle cost of $1,090, the cost-effectiveness without discounting the emissions for season (in $/ton) is then:

	VOC	CO	NOx	PM	VOC+NOx	VOC+NOx+CO/7+PM
CA LEV II Standards	55,000	15,000	214,000	17MM	44,000	31,000

The main cost of this measure is associated with CARB's ZEV mandate.

RESPONSIBLE AGENCY FOR IMPLEMENTATION

The State of Nevada would need to formally adopt California LEV II emission standards.

POLITICAL/SOCIAL/PUBLIC ACCEPTANCE
The high cost of the ZEV mandate (which is essentially an electric vehicle mandate) would likely be met with considerable opposition from the public. In addition, it is unlikely that any breakthroughs in battery technology will occur to make EVs a viable alternative to conventionally fueled vehicles in the foreseeable future.

MEASURE TITLE: ACCELERATED PURCHASE OF TIER 3 DIESEL ENGINES
CATEGORY TYPE: Nonroad Programs

NARRATIVE DESCRIPTION

This measure would seek to accelerate the fleet turnover by replacing all older engines (and equipment) with those engines less than 5 years old. This strategy is useful or needed if an interim year (such as is needed for attainment demonstration) requires added emission reductions over what is produced from normal turnover. Accelerated turnover could be accelerated purchase and also include repowering current equipment with newer engines. In the long run the fleet will completely turn over even if this strategy is not employed.

METHODOLOGY FOR ANALYSIS

Emissions

Only model years of 5 years old or newer, evenly distributed by age, were considered in the actual in-use age distribution. For years like 2005 and 2010, the use of Tier 2 and Tier 3 will be significantly higher than using normal turnover assumptions. In later years, 2020 or 2025, the emission reduction becomes very small over what emission reduction would have occurred with normal turnover. This is in part due to the assumption in the EPA emissions models that there is no deterioration.

Cost

Tier 2 per engine costs range from $200-300 (50 - 175 hp) to $1,400 (750+ hp). Tier 3 per engine costs range from $300 (100-175 hp) to $1,900 (300-750 hp) in addition to Tier 2 costs. This is expected to increase the engine (only, not the equipment) purchase price by 5-10% (EPA, Regulatory Impact Analysis for the Compression-Ignition Engine Rulemaking, 1998). There may be additional costs associated with early retirement or moving old equipment out of an ozone nonattainment area.

RESULTS

Emissions

Because the new emission standards primarily focus on NOx reduction, the greatest reductions are seen here. Depending upon the nonroad category and in-use year, the emission reduction percentage shown in the table below is applied to the base year inventory to determine the tonnage reduction.

Percent Change with Accelerated Turnover for Various In-Use Years.

Category	Pollutant	2005	2010	2015	2020
Recreational	HC	0	0	0	0
	CO	0	0	0	0
	NOx	-3	-4	-3	-1
	PM	-2	-1	0	0
Construction	HC	-14	-20	-11	-5
	CO	-9	-3	-2	-2
	NOx	-14	-25	-14	-7
	PM	-4	-3	-2	-1
Industrial	HC	-11	-12	-8	-4
	CO	-4	-2	-1	-1
	NOx	-15	-20	-16	-10
	PM	-4	-3	-2	-1
Lawn & Garden	HC	0	0	0	0
	CO	0	0	0	0
	NOx	-7	-9	-6	-3
	PM	-1	0	0	0
Agricultural	HC	-5	-22	-17	-9
	CO	-17	-2	-1	-1
	NOx	-21	-35	-28	-16
	PM	-7	-5	-4	-2
Commercial	HC	-2	-3	-2	-1
	CO	0	0	0	0
	NOx	-15	-22	-18	-11
	PM	-2	-1	-1	-1
Logging	HC	-14	-20	-11	-5

	CO	-9	-3	-2	-2
	NOx	-14	-25	-14	-7
	PM	-4	-3	-2	-1
Airport GSE	HC	-17	-25	-16	-6
	CO	-10	-4	-1	-1
	NOx	-20	-34	-24	-10
	PM	-3	-1	-1	-0

Tonnage Reduction for Accelerated Tier 3 Diesel Turnover.

In-Use Year	Summer VOC (tpd)	Summer NOx (tpd)	Summer PM (tpd)	Winter CO (tpd)	Winter PM (tpd)
2005	-0.65	-5.61	-0.06	-0.80	-0.04
2010	-0.30	-2.59	-0.05	-0.36	-0.03
2015	-0.25	-2.13	-0.05	-0.34	-0.03
2020	-0.11	-1.07	-0.03	-0.32	-0.02
2025	~0	~0	~0	~0	~0

Cost-Effectiveness ($/ton)

The cost of the accelerated turnover of equipment is very difficult to determine because determining the additional capital cost for new engines/equipment over the resell (out of Clark Co.) price of old engines/equipment is difficult.

For the year 2005, our estimate is that roughly half of the fleet of 23,500 diesel engines in Clark Co. is scrapped for $0 and replaced by Tier 2 engines at an average price of $11,000. [This is a pessimistic estimate that assumes that fleet managers will not plan purchases according to the emissions standards by delaying normal new equipment purchase until new emission standards are in place.] Therefore, the cost of this immediate fleet turnover in 2005 would be $129 million. The cost-effectiveness can be improved dramatically by proper planning, for which the extra cost could be considered as the increment from Tier 1 to Tier 2 engines of approximately $1,000 instead of $11,000. No cost-effectiveness ratio was computed for PM alone as the values would have been extremely high.

Calendar Year	VOC	CO	NOx	PM	VOC+NOx	VOC+NOx+CO/7+Avg.PM
2005 (high estimate)	500,000	440,000	63,000	N/A	56,000	55,000
2005 (low estimate)	49,000	40,000	6,000	N/A	5,000	5,000

RESPONSIBLE AGENCY FOR IMPLEMENTATION

The State of Nevada would have to adopt a plan for introduction of newer engines in advance of normal turnover.

POLITICAL/SOCIAL/PUBLIC ACCEPTANCE

The rapid turnover strategy may be difficult to implement, requiring either a registration program or other reporting requirement that will affect local businesses.

MEASURE TITLE: ELECTRIFICATION OF AIRPORT GROUND SERVICE EQUIPMENT
CATEGORY TYPE: Nonroad Programs

NARRATIVE DESCRIPTION

The airports in the Las Vegas Area replace their current ground support equipment (GSE) fleet with electric-powered equipment. Many areas (such as Boston and Los Angeles) are already replacing or are considering replacing their internal combustion engine powered equipment with an all electric fleet.

METHODOLOGY FOR ANALYSIS

Emissions
The emissions for GSE equipment are zeroed out in the inventory. The accompanying emissions associated with increased electric power demand were not figured into the calculations.

Cost
Sierra Research (1998) estimated that the cost per baggage handler would be expected to be roughly $12,000 higher for an electric than a diesel baggage handler. However, Sierra also estimated that during its lifetime, the fuel savings would more than pay for the increased initial cost. Arcadis (1999) also found that the cost would be less for electric GSE provided the power substation and airport wiring are suitable for the additional electric load.

RESULTS

Emissions
The HC, CO, NOx, and PM emissions associated with GSE are small under the current inventory estimates.

In-Use Year	Summer VOC (tpd)	Summer NOx (tpd)	Summer PM (tpd)	Winter CO (tpd)	Winter PM (tpd)
2005	-0.39	-0.66	-0/01	-12.73	-0.01
2010	-0.33	-0.56	-0.01	-12.96	-0/01
2015	-0.29	-0.46	-0.01	-14.01	-0.01
2020	-0.28	-0.42	-0.01	-15.03	-0.01
2025	-0.30	-0.43	-0.02	-16.24	-0.02

Cost-Effectiveness ($/ton)
Because the cost of the equipment is expected to pay for itself in the long run, there is expected to be no $/ton estimate to obtain this emission reduction. Several considerations about the cost of upgrading the electric infrastructure, the vehicle range, and the transition to an all electric fleet cannot be assessed in this work.

RESPONSIBLE AGENCY FOR IMPLEMENTATION

The local airports would be encouraged to turn over their vehicle fleet either from the state or local agencies.

POLITICAL/SOCIAL/PUBLIC ACCEPTANCE

Electric vehicles carry several implementation issues, such as range and capital cost specific to each airport's current operation.

MEASURE TITLE: CALIFORNIA LARGE (>25HP) SPARK-IGNITION STANDARDS
CATEGORY TYPE: Nonroad Programs

NARRATIVE DESCRIPTION

The State of Nevada adopts the State of California emission standards for large (>25 hp) spark-ignition (SI) off-road engines. These standards would apply to all large SI off-road engines except those used in agricultural and construction applications, which are preempted from state regulation by federal law.

These engines are primarily used for forklifts and other similar industrial applications. The engines are usually similar to automotive engines and are expected to meet the new emissions standards with similar automotive technology, closed-loop engine control and three-way catalysts.

METHODOLOGY FOR ANALYSIS

Emissions

The emission standards are modeled by applying a revised emission factor for the 2001 model year for the applicable engines in the NONROAD model. The emission reduction control factor (% reduction) calculated by NONROAD for future years will be applied to the base inventory.

This measure uses standard fleet turnover assumptions, so delaying the standard or increasing fleet turnover will have an effect on the emission reduction predicted.

Cost

Cost per engine is expected to be $100 to $500 depending upon the engine size and typical engine type. Engines that currently apply closed-loop control would require less additional equipment reducing the overall cost of meeting the new standard. This can also be employed as a retrofit strategy on current in-use engines. Using a 5 year life and 7% annual return on investment, a $300 initial cost results in an annualized average cost per vehicle of $68.

RESULTS

Emissions

Emission reductions are expected for THC, CO, NOx, and PM emissions from this rule are shown in the tables below as a percentage and in tons per day.

Percent Emission Rate Reduction with Implementation of the California Large SI Emission Standards.

Segment	Emission	2005	2010	2015	2020	2025
Airport GSE	THC	-7	-18	-24	-28	-29
	CO	-21	-41	-46	-46	-46
	NOx	-2	-4	-5	-6	-6
	PM_{10}	-0	-0	-0	-0	-0
Commercial Equipment	THC	-5	-13	-17	-21	-23
	CO	-2	-5	-7	-8	-9
	NOx	-10	-14	-19	-23	-25
	PM_{10}	-0	-1	-1	-1	-1
Industrial Equipment	THC	-18	-41	-52	-56	-57
	CO	-22	-43	-49	-50	-50
	NOx	-10	-20	-26	-28	-28
	PM_{10}	-0	-0	-1	-1	-1
Lawn & Garden	THC	-3	-7	-8	-8	-8
	CO	-4	-5	-5	-6	-6
	NOx	-4	-6	-7	-7	-7
	PM_{10}	-0	-0	-0	-0	-0

Ton Per Day (TPD) Reductions with Implementation of CA Large SI Standards.

In-Use Year	Summer VOC (tpd)	Summer NOx (tpd)	Summer PM (tpd)	Winter CO (tpd)	Winter PM (tpd)
2005	-0.27	-0.09	0.00	-3.97	0.00
2010	-0.49	-0.14	0.00	-7.81	0.00
2015	-0.59	-0.17	0.00	-9.65	0.00
2020	-0.66	-0.19	0.00	-10.72	0.00
2025	-0.73	-0.20	0.00	-11.77	0.00

Cost-Effectiveness ($/ton)

EPA estimated the total number of large SI engines in the country by category (EPA, 1999) in 2010. Applying the NEVES category fractions to the EPA estimate of numbers of engines and growing by 2% per year from 2010, it can be expected that roughly 1,700 large SI engines meeting the emission standards will be operating in Clark Co. in 2020. The cost-effectiveness for such a strategy is usually determined on a per vehicle basis, but is not likely to be much different than that shown below for 2020.

Calendar Year	VOC	CO	NOx	PM	VOC+NOx	VOC+NOx+CO/7+Avg.PM
2020	500	30	1,700	N/A	400	100

RESPONSIBLE AGENCY FOR IMPLEMENTATION

The State of Nevada will need to adopt the California regulations for these engine types.

POLITICAL/SOCIAL/PUBLIC ACCEPTANCE

Other than the owner/operators of these equipment types who will incur increased purchase prices, the measure will not generally affect the public. Issues, such as shielding high temperature catalysts, will be addressed by the original equipment manufacturers.

Measures Targeting Emissions from In-Use Vehicles and Engines (excluding TCMs)

ENVRION reviewed a list of potential control measures from in-use vehicles for their cost-effectiveness and their ability to be implemented. While some of these measures appear to have significant emission reduction potential, ENVIRON is not specifically recommending any of these control measures. Selection and adoption of any of these measures must occur by local and State authorities, after full public hearings, and then be submitted to EPA as SIP revisions by the NDEP.

Summaries of the control measures targeting emissions from in-use on- and off-road vehicles and engines are presented below. The measures in this category include:

- Improvements to the Clark County I/M program;
- Smoke inspections for on- and off-road diesel engines;
- Accelerated retirement of older on-road vehicles;
- Repowering of existing on-road heavy-duty diesel vehicles with cleaner engines;
- Retrofit of particulate traps on on- and off-road diesel vehicles; and
- Retrofit of selective catalytic reduction systems on on-road diesel vehicles.

With respect to gasoline-powered vehicles, improvements to the Clark County I/M program could lead to significant additional reductions in both VOC and CO emissions and will also provide some benefit with respect to NOx control. Implementation of an improved I/M program appears to be cost-effective for Clark County, unless the sole purpose of the program is to reduce NOx emissions, as the NOx only cost-effectiveness ratios generally exceed the highest value recommended by CARB. In contrast, accelerated vehicle retirement looks less attractive as a modestly scaled program generates lower benefits at a somewhat higher cost-effectiveness ratio.

The evaluation of measures in this group targeting diesel vehicles indicates that, in general, there are a number of what appear to be cost-effective approaches to reducing NOx emissions from on- and off-road diesel vehicles. However, most of these measures involve the application of retrofit emission control devices or repowering of diesel vehicles. The cost-estimates used here for such measures reflect high volumes that would be realized only if such programs come into general application across the country in areas with air quality problems. In addition, reductions in PM emissions from diesels is much more expensive than reduction of PM emissions from area sources, although an effective I/M program based on periodic and random smoke measurements appears to have the potential to provide PM reductions at a lower cost than other measures targeting diesels. However, as pointed out below, there is a considerable amount of uncertainty surrounding the estimated emission benefits associated with that type of program.

MEASURE TITLE: INSPECTION AND MAINTENANCE PROGRAM ENHANCEMENTS
CATEGORY TYPE: On-Road Motor Vehicle

NARRATIVE DESCRIPTION

Two changes to the current I/M program were considered in this evaluation: (1) change the current decentralized (i.e., test-and-repair) program to a centralized program (while retaining the two-speed idle test); and (2) centralized testing along with implementation of IM240 test procedures and evaporative system pressure checks. Because decentralized I/M programs (i.e., those in which testing and repair can be performed at the same shop) have long been subject to fraud and inefficiencies, a move to centralized testing is expected to result in additional benefits from the I/M program. The use of the more rigorous IM240 test procedure along with a functional pressure check of the evaporative control system (as currently being performed in the Arizona program) would increase benefits of the program even more. It was assumed that both program revisions (as well as the current baseline program) would include a check of the on-board diagnostic (OBD II) system for the presence of fault codes on those vehicles so equipped (i.e., most 1996 and later model year cars and light trucks).

Although OBD II checks would be required on 1996 and newer vehicles, continuation of tailpipe testing will remain an important component of I/M programs at least through calendar year 2010 because:

- Pre-1996 model year vehicles account for 50% to 60% of exhaust emissions (depending on pollutant) from the light-duty fleet in 2005, and for approximately 25% of exhaust emissions from the light-duty fleet in 2010.
- Many first generation OBD II systems (e.g., 1996 to 1998 model years) contained a number of "deficiencies" allowed under the regulations. Thus, critical emission control components are not monitored in a significant fraction of the fleet. As a result, tailpipe testing will need to be conducted on those vehicles.
- OBD II systems have trigger levels for illuminating the MIL that are extraordinarily stringent; far beyond the stringency associated with EPA's final IM240 cutpoints. As a result, requiring older OBD II-equipped vehicles to pass an OBD check will not be cost-effective or politically feasible. Thus, tailpipe loaded mode testing will be required to separate the gross emitters from marginal failures.6

A program feature that was not evaluated in this study that could prove to be more cost-effective is exempting newer vehicles (e.g., less than four or five years of age) from the I/M program altogether. Because of the improved durability of late-model vehicles, they rarely fail an I/M short test when relatively new. Thus, excluding them from the I/M program would save on testing costs without having a significant impact on program benefits. Extending this idea further, an option that could be considered for OBD-equipped vehicles is a longer exemption period (assuming repairs will be made as long as the vehicle is under warranty) or a simple check of the vehicle computer for fault codes up to a certain age (e.g., six or eight years), and then requiring both an OBD check and a tailpipe test for all older vehicles.

6 If such an approach is not taken, motorists will be faced to pay for the full cost of what could be a multitude of repairs that generate very little in terms of emission reductions. For example, on a vehicle certified to a Tier 2 NMOG standards of 0.055 g/mile, the MIL will illuminate for catalyst failure once emissions reach 0.0825 g/mile. Given that the cost of catalyst replacement will be on the order of $500 to $1,000, this represents a very expensive repair on an older vehicle that would yield little in the way of emission benefits. Further, since the OBD system gives no information regarding the degree of deterioration, emissions testing will be required to determine whether or not the failed catalyst is really creating high emissions.

METHODOLOGY FOR ANALYSIS

Emissions

Emission reductions were estimated by modifying the I/M credits (by model year) that were used to generate the baseline inventory. For pre-1996 model year vehicles (i.e., those not equipped with OBD II systems), the I/M impacts were based on the IM240 credits developed by EPA for the Tier 2 modeling. These were used directly for the IM240 analysis, and they were discounted to reflect two-speed idle testing. For 1996 and later model year vehicles (i.e., those equipped with OBD II systems), EPA's assumptions regarding fault identification efficiency (85%) and owner response to MIL illumination (90%) were used. Note that for the current decentralized program, it was assumed that owner response to MIL illumination would be 90% for vehicles with less than 36,000 miles and 50% for vehicles with more than 36,000 miles. The latter assumption was intended to mimic the 50% discount EPA has historically assigned to decentralized programs.

Cost

The cost of centralized testing using the current two-speed idle test was estimated to be $15 per test. The cost of centralized testing with IM240 testing and a functional pressure check was estimated to be $30 per test. It was assumed that testing would be performed on a biennial basis, and that the failure rate for the two-speed idle test would be 12% and the IM240 test would be 18%. Further, average repair cost was assumed to be $150 for the two-speed idle test and $200 for the IM240 test. Based on forecasting 1996 registration data, it was assumed that 1,030,000 vehicles would be subject to the program in 2005 and 1,190,000 would be subject to the program in 2010. As noted below, significant reductions in overall program costs could be achieved with a small loss in benefits by excluding the first four or five model years from the program (because new vehicles rarely fail an I/M short test). Finally, because it typically takes 5 to 7 years to recover the fixed costs associated with centralized, dynamometer-based programs, implementation in the 2002 to 2003 timeframe would allow for sufficient time to recover costs while continuing to provide cost-effective emission reductions. Excluding OBD-equipped vehicles from the tailpipe testing portion of the program would amount to a cost savings of only about $3.00 per initial test.

RESULTS

Emissions

Emission reductions are expected for VOC, CO, and NOx. Overall fleet emission reductions were prepared for 2005 and 2010 for a change to centralized testing and for a change to centralized testing with IM240 testing and a functional pressure check of the evaporative control system. VOC and NOx reductions are based on summertime estimates; CO is based on winter estimates. The reductions shown below are in addition to the benefits of the current program. Benefits in 2010 are larger than in 2005 partially because of EPA's optimistic assumptions regarding the impact of OBD II system checks.

Centralized Testing

	VOC	CO	NOx
Calendar Year 2005	5.0%	7.9%	1.6%
Calendar Year 2010	10.2%	12.9%	5.5%

Centralized Testing + IM240 and Pressure Checks

	VOC	CO	NOx
Calendar Year 2005	16.7%	15.2 %	5.0%
Calendar Year 2010	18.8%	16.7%	7.5%

Cost-Effectiveness ($/ton)

The cost-effectiveness of this measure is outlined below. Note that the cost-effectiveness could be further improved by exempting vehicles under 5 years of age from I/M testing requirements. Because new vehicles rarely fail an I/M short test, the benefits are nearly the same and overall testing costs are reduced significantly.

Centralized Testing

	VOC	CO	NOx	VOC+NOx	VOC+NOx+CO/7
Calendar Year 2005	$10,200	$810	$30,400	$7,600	$3,200
Calendar Year 2010	$6,300	$670	$12,200	$4,200	$2,200

Centralized Testing + IM240 and Pressure Checks					
	VOC	CO	NOx	VOC+NOx	VOC+NOx+CO/7
Calendar Year 2005	$9,200	$1,100	$28,300	$7,000	$3,700
Calendar Year 2010	$9,200	$1,200	$20,700	$6,400	$3,600

RESPONSIBLE AGENCY FOR IMPLEMENTATION

The State of Nevada

POLITICAL/SOCIAL/PUBLIC ACCEPTANCE

Overall, there would likely be a net decrease in consumer cost (relative to the current program) as a result of centralized testing, and a slight increase if IM240 testing was also added. However, there would likely be some reluctance on the part of the public to embrace the program because there is often a perception that centralized test facilities inherently have long wait times. The most severe opposition would be expected from the independent repair industry, which has successfully lobbied in California for many years (at the expense of improved air quality) to kill program changes that would result in centralized testing in the state.

MEASURE TITLE: LIGHT-DUTY VEHICLE SCRAPPAGE PROGRAM
CATEGORY TYPE: On-Road Motor Vehicle

NARRATIVE DESCRIPTION

Under this measure, 5% of the 21 to 25-year old light-duty fleet (passenger cars and light-duty trucks) would be scrapped and replaced with a fleet-average vehicle. Overall VMT is assumed to be unchanged as a result of this measure. Estimates were prepared for the 2005 and 2010 calendar years.

METHODOLOGY FOR ANALYSIS

Emissions

Emission reductions were estimated by reducing the travel fractions for 21 to 25-year old light-duty cars and trucks by 5%, and then renormalizing the resultant fractions such that the total was unity. The fleet-average emission rates for HC, CO, and NOx were then re-computed with the revised travel fractions, and the difference in fleet-average emission rates was applied to the baseline inventory estimates previously developed. It is important to note that the program evaluated here represents a "general" scrappage program as the vehicles eliminated are assumed to have emissions equal to the average vehicle of that age. A "targeted" program focused on elimination of high emitting vehicles could generate additional reductions and could have a lower overall cost-effectiveness ratio, i.e., better cost-effectiveness.

Cost

The cost of this program was assumed to be $500 per vehicle for the purchase price and $150 per vehicle for administrative fees. For the 2005 program, a total of 3,618 vehicles were assumed to be scrapped for a total program cost of $2,351,700. In 2010, a total of 4,300 vehicles were assumed to be scrapped for a total program cost of $2,795,000.

RESULTS

Emissions

Emission reductions are expected for VOC, CO, and NOx. Overall fleet emission reductions were prepared for 2005 and 2010 and are shown below (VOC and NOx based on summer estimates; CO based on winter estimates).

	VOC	CO	NOx
Calendar Year 2005	0.5%	0.4%	0.1%
Calendar Year 2010	0.5%	0.3%	0.2%

Cost-Effectiveness ($/ton)

The cost-effectiveness of this measure is outlined below. Note that the benefits of scrappage were assumed to last for three years in calculating the cost-effectiveness estimates. Also note that the assumed bounty of $1,000 per vehicle could possibly be reduced since the focus of this measure is on the oldest vehicles in the fleet.

	VOC	CO	NOx	VOC+NOx	VOC+NOx+CO/7
Calendar Year 2005	$9,300	$1,400	$30,700	$7,200	$4,200
Calendar Year 2010	$12,200	$2,600	$32,900	$8,800	$5,900

RESPONSIBLE AGENCY FOR IMPLEMENTATION

Clark County would have to adopt and implement regulations for vehicle scrappage.

POLITICAL/SOCIAL/PUBLIC ACCEPTANCE

Scrappage programs for air pollution control has been implemented in several other states, as well as other countries. The public generally accepts them as long as they remain voluntary. Care must be taken, however, to assure that the scrapped vehicles are disposed of in an environmentally-safe manner and not merely shipped to another state or country.

MEASURE TITLE: IMPLEMENTATION OF A ROAD SIDE AND PERIODIC SMOKE INSPECTION PROGRAM
CATEGORY TYPE: Diesel-Fueled On and Off-Road Motor Vehicles

NARRATIVE DESCRIPTION

Under this measure, the state of Nevada or Clark County would adopt regulations requiring the annual inspection of all diesel powered on- and off-road vehicles for smoke emissions using the "snap idle" test procedure. In addition, a road/operating site inspection program would be implemented to provide for greater enforcement. This program would be similar to that in place in California for on-road vehicles.

METHODOLOGY FOR ANALYSIS

Emissions

Emission reductions estimates were based on the CARB rulemaking, which reinstated the California program. Assumed NOx reductions were 3% and PM_{10} reductions were 18% based on CARB staff estimates for on-road engines. These reductions were applied to the baseline emission inventories for on- and off-road diesel engines developed for this study. Note that the CARB estimates may overstate the benefits of this program with respect to NOx emission reductions and for future vehicles. As a result, emission reduction estimates were only performed through 2010. In addition, the very limited data available (McCormick, 1999) regarding repaired vehicles suggests a modest NOx increase rather than the decrease assumed by CARB.

Cost

The cost estimates used for analyzing this measure were also taken from data used in the CARB rulemaking. The total number of vehicles inspected in the Las Vegas Valley was assumed to be 50,000 per year in 2005 and it was assumed that the number of vehicles inspected per year would increase as a function of population growth in the region. These inspection figures were used to scale CARB's cost estimates, which were based on much higher assumed testing volumes. The total annual cost for this program was estimated to range from $1.1 million in 2005 to about $1.3 million in 2010.

RESULTS

Emissions

Emission reductions are expected primarily for NOx and PM from this rule. Emission reductions in tons per day for NOx and PM are presented below.

	On-Road		Off-Road	
	NOx	PM	NOx	PM
Calendar Year 2005	0.5	0.1	0.6	0.3
Calendar Year 2010	0.4	0.1	0.5	0.4

Cost-Effectiveness ($/ton)

The cost-effectiveness of this measure is outlined below:

	NOx	PM	NOx+PM
Calendar Year 2005	2,740	6,640	1,940
Calendar Year 2010	4,010	7,160	2,570

RESPONSIBLE AGENCY FOR IMPLEMENTATION

The State of Nevada.

POLITICAL/SOCIAL/PUBLIC ACCEPTANCE

While this type of program has been applied to on-road vehicles in a number of states, it has not yet been applied to non-road equipment. Therefore, substantial difficulty with implementation and enforcement might be experienced.

MEASURE TITLE: REPOWERING OF EXISTING HEAVY-DUTY DIESEL VEHICLES (HDDVs) TO OPERATION ON NATURAL GAS OR WITH LOW EMISSION DIESEL ENGINES
CATEGORY TYPE: On-Road Motor Vehicle

NARRATIVE DESCRIPTION

Under this measure, a HDDV repowering program would be implemented in Clark County. For this analysis, it was assumed that 1998 model-year class 8B HDDVs would be repowered with either natural gas engines or low emissions engines operating on diesel fuel. It was also assumed that vehicles participating in this program would operate exclusively in the Las Vegas Valley.

meeting a 1.8 g/bhp-hr NOx standard and with effective PM emissions of 0.03 g/bhp-hr or diesel engines meeting the new engine certification standards applicable to the 2003 model year.

METHODOLOGY FOR ANALYSIS

Emissions
It was assumed that the replaced engine would emit at rates equivalent to those of 1998 model-year engines. Replacement natural gas engines would be certified to meet a 1.8 g/bhp-hr NOx standard and have effective PM emissions of 0.03 g/bhp-hr. Diesel engines were assumed to meet the new engine certification standards applicable to the 2003 model year. Emission reductions were computed on a per vehicle basis assuming that the repowered vehicle would continue in operation for an additional twenty-five years following repowering with annual mileage accumulation rates commensurate with other vehicles of the same vintage. Higher in-use NOx emissions associated with the use of so-called defeat devices are accounted for in this analysis.

Cost
The of repowering with a natural gas engine was assumed to be $50,000 which includes the costs associated with natural gas refueling infrastructure. The cost of repowering with a low-emission diesel engine was assumed to be $35,000 per vehicle.

RESULTS

Emissions
Emission reductions are expected for NOx and PM from this rule. On a per-vehicle lifetime basis, the following reductions were estimated:

	NOx	PM_{10}
Natural Gas	14.2 tons	0.14 tons
Low Emission Diesel	13.2 tons	0.00 tons

Cost-Effectiveness ($/ton)
The cost-effectiveness of this measure was determined by dividing the lifetime reductions above by the cost associated with the two repowering options. The cost-effectiveness of this measure is presented below. Note that these estimates have not been adjusted to account for seasonal benefits relative to lifetime costs.

	NOx	PM_{10}	NOx+PM_{10}
Natural Gas	3,520	357,000	3,490
Low Emission Diesel	2,650	-	2,650

RESPONSIBLE AGENCY FOR IMPLEMENTATION

The State of Nevada or Clark County.

POLITICAL/SOCIAL/PUBLIC ACCEPTANCE

The use of natural gas engines in HDDVs outside of captive centrally fueled fleets would not be feasible without the development of a widespread natural gas refueling infrastructure. It is also expected that subsidies to offset the costs associated with repowering would have to be provided to vehicles used in non-governmental fleets.

MEASURE TITLE: RETROFIT OF EXISTING HEAVY-DUTY DIESEL VEHICLES (HDDVs) WITH SELECTIVE CATALYTIC REDUCTION (SCR) AND/OR PM TRAPS

CATEGORY TYPE: On-Road Motor Vehicle

NARRATIVE DESCRIPTION

Under this measure, an emission control retrofit program for HDDV would be implemented in Clark County. For this analysis, it was assumed that 1998 model-year class 8B HDDVs would be retrofit with SCR systems, PM traps or both control devices. It was also assumed that vehicles participating in this program would operate exclusively in the Las Vegas Valley.

METHODOLOGY FOR ANALYSIS

Emissions

It was assumed that the replaced engine would emit at rates equivalent to those of 1998 model-year engines. SCR systems were assumed to reduce NOx emissions by 80% and PM traps were assumed to reduce effective PM emissions to 0.01 g/bhp-hr. Emission reductions were computed on a per vehicle basis assuming that the repowered vehicle would continue in operation for an additional twenty years following repowering with annual mileage accumulation rates commensurate with other vehicles of the same vintage. Higher in-use NOx emissions associated with the use of so-called defeat devices are accounted for in this analysis.

Cost

The cost of an SCR retrofit was assumed to be $2,500[1] per vehicle and the cost of a PM trap retrofit $7,500 per vehicle. Both of these values assume relatively high volume production and, therefore, the use of these systems either on new HDDV engines or the existence of widespread retrofit programs. Costs may be significantly higher if production volumes are at lower levels when a retrofit program is considered. The costs of urea are assumed to be included in the SCR cost estimate. The lifetime cost of a fuel borne catalyst or low sulfur diesel fuel to facilitate the use of the PM trap was assumed to be $3,000 for a total cost of $10,500 for the trap system. The cost of a combined system was assumed to be $13,000 per vehicle.

RESULTS

Emissions

Emission reductions are expected for NOx and PM from this rule. On a per-vehicle lifetime basis, the following reductions were estimated:

	NOx	PM_{10}
SCR	12.5 tons	0.00 tons
PM Trap	0.00 tons	0.14 tons
Combination	12.5 tons	0.14 tons

Cost-Effectiveness ($/ton)

The cost-effectiveness of this measure was determined by dividing the lifetime reductions above by the cost associated with the two repowering options. The cost-effectiveness of this measure is presented below. Note that these estimates have not been adjusted to account for seasonal benefits relative to lifetime costs.

	NOx	PM_{10}	NOx+PM_{10}
SCR	200	-	200
PM Trap	-	75,000	75,000
Combination	-	-	1,030

RESPONSIBLE AGENCY FOR IMPLEMENTATION

The State of Nevada or Clark County.

POLITICAL/SOCIAL/PUBLIC ACCEPTANCE

The widespread availability of SCR systems or PM traps for general application to HDDVs is currently limited and combined systems have yet to be demonstrated. Impaired vehicle performance could result from the emissions control system retrofit.

[1] SCR retrofit costs for NOx control vary widely in the literature. The cost assumed here is likely a lower boundary.

MEASURE TITLE: OXIDATION CATALYSTS
CATEGORY TYPE: Nonroad Programs

NARRATIVE DESCRIPTION

The most straightforward retrofit device for nonroad engines is the additional of an oxidation catalyst, which will reduce HC, CO, and PM. Oxidation catalysts will reduce only the soluble organic fraction (SOF) of the particulate matter leaving elemental carbon and possibly slightly increasing the sulfate portion of particulate matter. The most effective applications of oxidation catalysts are for older diesel engines. Typically the oxidation catalyst is installed with or instead of a muffler assembly, but may require some exhaust insulation to maintain proper operating temperatures for the catalyst to light-off. Very low sulfur fuel (<50 ppm) is not required, but its use would improve the catalyst's effectiveness. The installation of the catalyst is most cost-effective on larger engines that operate more hours per year.

Some thought to the application is needed to ensure that exhaust temperatures are sufficient for light-off — 500 °F to 700 °F depending upon fuel sulfur level. However, field experience with these oxidation catalysts has been good, with a number of applications having few operational problems.

METHODOLOGY FOR ANALYSIS

Emissions

Typical emission reductions associated with the application of an oxidation catalyst on nonroad diesel engines were taken from certification submissions for the EPA's Urban Bus Retrofit program. These reductions are usually reported as conservatively less than found in practice to provide a compliance margin.

Retrofit strategies are more effective when applied to larger engines. For instance, of the emissions associated with construction equipment (the largest single nonroad source category), diesel engines greater than 100 hp are responsible for 75% of THC, 44% of CO, 96% of NOx, and 92% PM.

Emissions reductions are expected to be about 20% for PM (SOF only), and about 50% for CO and HC.

Cost

Quoted costs for oxidation catalyst installation are $800-$2,500 depending upon engine size and ease of installation. Other estimates are approximately $11 per rated horsepower, which is consistent with the total dollar figures above. Using an average excavator of 156 hp, an average life of 5 years, and 7% return on investment, the annualized capital cost is $420/year.

RESULTS

Emissions

Emission reductions are expected for THC, CO, and PM emissions from the addition of oxidation catalysts, which for example applied to an average excavator would result in HC, CO, and PM reductions of 0.06, 0.26, and 0.014 tons per year. If applied to all diesel engines, the expected emission reductions are shown in the table below.

In-Use Year	Summer VOC (tpd)	Summer NOx (tpd)	Summer PM (tpd)	Winter CO (tpd)	Winter PM (tpd)
2005	-2.27	0.00	-0.47	-1.64	-0.26
2010	-2.05	0.00	-0.50	-1.64	-0.28
2015	-2.08	0.00	-0.54	-1.75	-0.30
2020	-2.23	0.00	-0.58	-1.88	-0.32
2025	-2.38	0.00	-0.61	-2.02	-0.34

Cost-Effectiveness ($/ton)

For the entire diesel fleet of approximately 23,500 engines, the annual cost of implementing oxidation catalysts is about $10 million for the in-use year 2005. Using the excavator example, the cost-effectiveness for this control measure can be improved to $3,800/ton of emission reduction compared to 9,000 $/ton for all diesel engines. So targeted reductions can be more cost-effective if applied to larger engines.

Calendar Year	VOC	CO	NOx	PM	VOC+NOx	VOC+NOx+CO/7+Avg.PM
2005	12,000	17,000	N/A	76,000	12,000	9,000
2010	15,000	18,000	N/A	76,000	15,000	11,000
2015	15,000	18,000	N/A	76,000	15,000	12,000
2020	15,000	18,000	N/A	76,000	15,000	12,000
2025	15,000	18,000	N/A	76,000	15,000	12,000

RESPONSIBLE AGENCY FOR IMPLEMENTATION

Nonroad equipment owners based in Clark Co. could be encouraged to retrofit equipment with these devices either through a state or local regulation or through a cost incentive program.

POLITICAL/SOCIAL/PUBLIC ACCEPTANCE

Overall these devices will substantially reduce the visible smoke and smell associated with diesel engines and increase public acceptance of diesel engines. Maintenance is not usually an issue, so the cost associated with the implementation is the main area of concern.

MEASURE TITLE: PARTICULATE FILTERS/TRAPS
CATEGORY TYPE: Nonroad Programs

NARRATIVE DESCRIPTION

The most effective retrofit device for reducing PM from nonroad engines is the addition of a particulate trap oxidizer, which will likely also reduce HC and CO. Particulate traps will filter nearly all of the particulate. Typically the particulate traps are less tolerant of operation condition variations (fuel quality, injector failure, regular maintenance) than oxidation catalysts are, possibly resulting in excess backpressure. Very low ash and sulfur content in the fuel (<50 ppm) is typically required. Some thought to the application is needed to ensure that exhaust temperatures are sufficient for light-off; 550 °F to 750 °F depending upon fuel sulfur level. Field experience with particulate traps has been more limited than with oxidation catalysts with a few urban bus fleets and other specific projects operating well. Some attention must be paid to maintenance, specifically cleaning and reversing the filters, and operators must check for engine problems such as bad injectors, and excessive oil consumption, which could plug the traps. This increased maintenance can be performed along with other routine maintenance such as oil filter changes with minimal training or extra resources.

METHODOLOGY FOR ANALYSIS

Emissions

Typical emission reductions associated with the application of a particulate trap on nonroad diesel engines were taken from certification submissions for the EPA's Urban Bus Retrofit program. These reductions are usually reported as conservatively less than found in practice to provide a compliance margin.

Retrofit strategies are more effective when applied to larger engines; for instance, of the emissions associated with construction equipment, diesel engines greater than 100 hp are responsible for 75% of THC, 44% of CO, 96% of NOx, and 92% PM and represent much fewer numbers of diesel-powered equipment. Expected emissions reductions are 90% for PM and while reductions for HC and CO emissions are generally expected, their magnitude depends on the type of trap used. Therefore, HC and CO emission reductions were not quantified here.

Cost

The cost of a PM trap retrofit $7,500 per vehicle. The lifetime cost of a fuel borne catalyst or low sulfur diesel fuel to facilitate the use of the PM trap was assumed to be about $100 a year for a total annualized cost of $1,900 for the trap system. These systems are now becoming more widespread, reducing the overall cost perhaps below what is modeled here.

RESULTS

Emissions

Emission reductions are expected for PM emissions from the addition of particulate traps, which for example applied to an average excavator would result in PM reductions of 0.062 tons per year for one average excavator. Another example is applying this strategy to all construction and mining equipment greater than 100 hp. This results in summer daily emissions reductions of 1.5 tons/day PM and winter daily emissions reductions of 1.1 tons/day PM. Applying this technology to all diesel engines results in the reductions shown in the table below.

In-Use Year	Summer VOC (tpd)	Summer NOx (tpd)	Summer PM (tpd)	Winter CO (tpd)	Winter PM (tpd)
2005	0.00	0.00	-2.10	0.00	-1.17
2010	0.00	0.00	-2.27	0.00	-1.27
2015	0.00	0.00	-2.43	0.00	-1.36
2020	0.00	0.00	-2.60	0.00	-1.45
2025	0.00	0.00	-2.76	0.00	-1.55

Cost-Effectiveness ($/ton)

For the entire diesel fleet of approximately 23,500 engines, the annual cost of implementing particulate trap catalysts is about $45 million for 2005. The cost-effectiveness is therefore, estimated at $75,000/ton for the entire diesel fleet. Using the excavator example, the cost-effectiveness for this application is $31,000/ton of emission reduction or significantly less.

Calendar Year	VOC	CO	NOx	PM	VOC+NOx	VOC+NOx+CO/7+Avg.PM
2005	N/A	N/A	N/A	75,000	N/A	75,000
2010	N/A	N/A	N/A	76,000	N/A	76,000
2015	N/A	N/A	N/A	76,000	N/A	76,000
2020	N/A	N/A	N/A	76,000	N/A	76,000
2025	N/A	N/A	N/A	76,000	N/A	76,000

RESPONSIBLE AGENCY FOR IMPLEMENTATION

Nonroad equipment owners based in Clark Co. could be encouraged to retrofit equipment with these devices either through a state or local regulation or through a cost incentive program.

POLITICAL/SOCIAL/PUBLIC ACCEPTANCE

Overall these devices will substantially reduce the visible smoke and smell associated with diesel engines and increase public acceptance of diesel engines. Maintenance (though reported to be minor) is an issue as is the cost associated with the implementation.

MEASURE TITLE: RETROFIT OF EXISTING NONROAD DIESEL EQUIPMENT WITH SELECTIVE CATALYTIC REDUCTION (SCR)
CATEGORY TYPE: Nonroad Programs

NARRATIVE DESCRIPTION

Under this measure, an emission control retrofit program for nonroad equipment would be implemented in Clark County. For this analysis, it was assumed that diesel engines would be retrofit with SCR systems. It was also assumed that vehicles participating in this program would operate exclusively in the Las Vegas Valley.

METHODOLOGY FOR ANALYSIS

Emissions
SCR systems were assumed to reduce NOx emissions by 80%.

Cost
The cost of an SCR retrofit was assumed to be $2,500[(1)] per vehicle, which assumes high volume production. The costs of urea are assumed to be included in the SCR cost estimate. Using a 5 year average life, the annualized cost is roughly $610. Again, actual retrofit costs may be substantially higher depending on the production volumes and the pace of development of SCR technology for application to vehicular diesel engines.

RESULTS

Emissions
Emission reductions are expected only for NOx. The analysis provides results if all engines are retrofitted with this device, however, it is better suited to large engines.

Retrofit strategies are more effective when applied to larger engines; for instance, of the emissions associated with construction equipment, diesel engines greater than 100 hp are responsible for 75% of THC, 44% of CO, 96% of NOx, and 92% PM and represents roughly 2/3 the number of diesel-powered equipment.

For all diesel engines, the expected NOx reductions in summer tons per day are shown below.

In-use Year	NOx Reduction (tons/summer day)
2005	-17
2010	-14
2015	-11
2020	-11
2025	-12

Cost-Effectiveness ($/ton)
For the entire diesel fleet of approximately 23,500 engines, the annual cost of implementing SCR system catalysts is about $14 million for 2005. The cost-effectiveness is, therefore, estimated at about $2,300/ton for the entire diesel fleet. Applying SCR to only those engines above 100 hp results in almost all the benefit for almost half the cost with a cost-effectiveness of $1,600/ton. The effectiveness of this strategy will be less in future years as the engine out emission are reduced through emissions regulations.

Again, early implementation may be up to an order of magnitude higher in cost-effectiveness.

RESPONSIBLE AGENCY FOR IMPLEMENTATION

The State of Nevada or Clark County.

POLITICAL/SOCIAL/PUBLIC ACCEPTANCE

The widespread availability of SCR systems for general application to nonroad equipment is currently limited and has yet to be demonstrated.

(1) SCR retrofit costs for NOx control vary widely in the literature. The cost assumed here is likely a lower boundary.

Transportation Control Measures

Overview - Several potential transportation control measures (TCMs) were considered for inclusion in this evaluation. TCMs affect the amount of travel behavior as well as travel speeds and can have significant effects on emissions. However, it is very difficult to develop policies that have a significant effect on individual travel choices. People choose to drive for many valid reasons: lack of transit or ridesharing opportunities; responsibilities as parents to ensure children are gotten safely from child care, school, or extracurricular activities; personal convenience or preference, and the like. While TCMs can provide additional options, incentives to drive less, or other benefits, participation is ultimately an individual choice and is difficult to predict. Largely for these reasons, TCMs have historically resulted in much smaller emission reductions than measures influencing the amount of pollution per unit of travel (such as more stringent tailpipe standards or use of alternative fuels). However, TCMs are necessary parts of overall strategies to reduce emissions. In addition, as vehicles become cleaner through existing policies to affect emission rates, there is less opportunity to reduce emissions through technological measures. At this point, TCMs may become relatively more important (although paradoxically each reduced mile of travel will reduce emissions less than now because the vehicles will be much cleaner in the future).

In order to identify potential measures for evaluation, the following sources were used:

- Ongoing TCMs
- TCMs from 1998 Study "Carbon Monoxide Transportation Control Measures Analysis" by Lima and Associates (April, 1998), "performed on behalf of the Regional Transportation Commission for the Las Vegas Valley."
- Suggestions from individuals interviewed as part of the SB432 study
- TCMs implemented in other air quality nonattainment areas

The primary ongoing TCMs are the RTC's CATMATCH program, as well as ongoing programs such as the bicycle plan, park and ride lots, improved transit services (including rail and fixed guideway projects), and numerous traffic flow improvement projects. A comprehensive set of TCMs was evaluated in the 1998 study, which was an extensive look at possible TCMs, their effects, and costs over a range of scenarios. After narrowing a large list based on a variety of considerations (such as feasibility, cost, and potential effectiveness), that study examined congestion pricing, employer-based trip reduction ordinances, ridesharing, bicycle incentives, work schedule changes, telecommuting, and no drive days (in addition to three more technological measures involving fuels and I/M programs).

Several individuals interviewed for the TCM study had suggestions to offer for potentially effective TCMs. These included all those mentioned above, as well as several suggestions for reducing visitor automobile (rental and owned) traffic (as well as acknowledgement of the barriers to doing so). There was a mixture of opinions about the need for a monorail down the resort corridor. Several individuals also suggested public education campaigns from grade-school to adult level to encourage individuals to carpool or take transit more frequently.

Potentially there are hundreds of different possible TCMs and it would be beyond the scope of this study to evaluate a comprehensive list. The design and effect of any given TCM depends on many local factors such as the employment base, availability of transit, existing TCM implementation, travel attitudes, support of employers, and similar factors. Because of this there are nearly infinite possibilities that are feasible but in the absence of specific goals and policies, specific TCMs and scenarios are necessarily based on assumptions and goals for effectiveness.

The following considerations were used to select measures for inclusion in the quantitative analysis:

1. Ability to reduce emissions by a significant amount (potentially more than 1/2 percent);

2. Ability to reduce trips and or vehicle miles traveled (as opposed to changing only vehicle travel speeds which has a much smaller effect on emissions);

3. Current implementation and possibility of expansion;

4. Provision of reductions from major TCM "markets" such as employees or visitors; and

5. Representative of major categories of TCMs such as employer-based; pricing based; or incentive-based (as in provision of alternative modes such as bicycles or transit).

The first two considerations eliminated several common TCMs such as traffic signal synchronization, incident management, or provision of turn lanes from this analysis. These measures are important traffic flow improvement measures and can reduce emissions but usually (1) create relatively minor reductions; (2) can affect emissions in opposite directions (as certain speed changes can increase some pollutants while decreasing others; and (3) can be controversial in results due to difficulties in accurately specifying the before and after speeds. These considerations in no way alter the fact that these measures provide emission reductions, congestion relief, and improve safety. However, they do not generally provide emission reductions in the magnitude needed to make or break an air quality program. Previous implementation and analysis of such measures by the RTC demonstrate small reductions (on the order of 1/10 of a percent of less), which is consistent with the experience in other U.S. nonattainment areas.

Second, the RTC's current CATMATCH program combines numerous features of successful TCM programs aimed at reducing work-based travel. Such measures are key because work-based travel typically accounts for approximately one third of travel activity in most areas. Because of the large amount of visitor travel, in Las Vegas, only 22 percent is work based (including visitor-based business trips). In addition, the benefits of large concentrations of people at work sites and the decreased amount of variation in timing and locations of trips (as compared to non-work trips such as shopping, recreation, school, etc) make it more straightforward to implement TCMs at the work-site level. Frequently, employer-based programs are divided into components such as telecommuting or ridesharing. Since the CATMATCH program is a working program containing numerous features that are normally evaluated as one TCM, it is more efficient to evaluate the CATMATCH program as a whole rather than attempting to break it up into components.

Based on these considerations, the following measures were selected for quantitative analysis:

1. CATMATCH program using current participation estimates made by RTC. This results in a range of 1/3 to 2.7 percent of employees participating in this program;

2. Visitor-based program resulting in a two percent reduction in daily visitor auto trips in the year 2010 and a 5 percent reduction in the year 2020;

3. Parking pricing program consistent with parking pricing program evaluated in 1998 TCM Study;[7]

4. Mandatory no-drive days for non-essential personnel resulting in a 25 percent reduction in daily work trips and a 40 percent reduction in non-work trips; and

5. Regional bicycle incentives consistent with participation levels assumed in 1998 TCM study (see footnote regarding TCM number 3).

This set of measures is intended to provide a broad range of potential strategies and the expected effectiveness of these strategies. In addition, they are evaluated in such as way as to quickly and easily estimate the effects of increasing or decreasing the participation in each TCM as well as evaluating additional TCMs.

Assessment of Measures - As noted earlier, several TCMs that reduced trips and VMT were selected for evaluation. In order to evaluate their emission effects, for each scenario year, reductions in trips and VMT were multiplied by the emission factors appropriate for that scenario year. For consistency with the RTC calculations for the CATMATCH program, it is assumed that all travel reduced is at a speed of 35 mph. Although several of the measures primarily affect travel in the resort corridor and would affect travel at a range of speeds, this average provides a reasonable set of emission factors given the size of the TCM effects. A more detailed method would be to estimate the amount of trips and VMT reduced at each of a range of speeds (say between 2.5 - 5 mph; 5 - 10 mph; 10 - 20 mph; etc). However, this level of detail is not consistent with the nature of the scenarios, which are goal-based and therefore, approximate. All CO factors used are for winter while the VOC and NOx factors are for summer conditions. PM is not affected by season. Finally, the new model will calculate emissions from starting vehicles. Grams per trip are reported separately.

Average emission factors were calculated based on the VMT split between LDGV and LDGT for each analysis year. In other words, the emission factors are adjusted to reflect the proportion of the fleet that is composed of light duty autos and of light duty trucks. It is assumed that these are the vehicle classes affected by the TCMs evaluated here.

[7] This study did not examine individual years but rather several population levels. Population levels in 2000, 2010, and 2025 are roughly equivalent to the populations assumed in what they termed "scenarios B, C, and D," respectively.

Table 3-2. Percentage of Vehicle Class for LDGV and LDGT by Scenario Year.

Year	Percent LDGV	Percent LDGT	Percent of Both as Fraction of All Classes
2000	61.6	38.4	80.1
2005	54.0	46.0	78.8
2010	49.0	51.0	77.5
2015	47.0	53.0	76.6
2020	44.4	55.6	75.9
2025	42.0	58.0	75.0

Note that the fraction of light trucks relative to passenger vehicles rises in each future year. At the same time, the combination of passenger vehicles and light trucks relative to all vehicle classes decreases over the modeling period. These assumptions are based on EPA analyses in support of the Tier 2 rulemaking and in continuing development of the MOBILE6 model.

The following data and assumptions were relevant to each TCM evaluated. VMT and trips for 2005, 2015 and 2025 are interpolated, since specific values for these variables were not available. Development of the emission factors was described earlier in this report. Here, emission factors for light duty passenger cars and trucks only are included, as these are the vehicles generally influenced by TCMs. The emission factors presented are weighted according to the proportion of light duty passenger vehicles to trucks. The trip emission rates are average cold/hot starts. Use of these emission rates may produce somewhat conservative results as most TCMs tend to reduce cold starts more than hot starts.

Table 3-3. Data Used in TCM Evaluations.

Category	2000	2005	2010	2015	2020	2025
Population	1,383,335	1,633,915	1,836,859	2,016,609	2,173,843	2,327,761
Employment	790,564	870,774	935,973	1,001,390	1,056,511	1,110,529
Vehicle trips[8]	4,897,867	6,212,741	7,527,615	8,834,680	10,141,745	11,448,810
VMT	22,831,409	27,079,350	31,327,291	35,709,095	40,090,899	45,071,569
CO (g/mile)	6.27	5.42	4.24	3.79	3.62	3.6
CO (g/trip)	23.2	19.77	12.48	10.62	9.84	9.76
VOC (g/mile)	1.55	1.08	0.83	0.62	0.55	0.52
VOC (g/trip)	1.42	1.22	1.06	0.92	0.83	0.73
NOx (g/mile)	1.19	0.93	0.55	0.32	0.23	0.20
NOx (g/trip)	0.66	0.52	0.34	0.23	0.16	0.13
PM (g/mile)	0.03	0.025	0.02	0.02	0.02	0.02

Assumptions for VMT and trip reductions from the CATMATCH program were identical to those currently expected by the RTC. As noted earlier these reductions reflect a relatively modest goal of less than three percent of the workforce in all scenarios. Visitor programs were assumed to reduce two and five percent of rental auto trips by visitors in 2010 and 2020, respectively. These scenarios provide a good indication of the potential benefits from an aggressive campaign to provide alternative travel modes for visitors. Assumptions for the parking pricing and bicycle incentive program were based on the 1998 TCM study. For the mandatory program, which is presented primarily to illustrate the probable maximum that a

[8] (resident + visitor)

TCM could achieve, it was assumed that 25 percent of work trips and 40 percent of non-work trips would be reduced on a given day. The mandatory program was modeled in its most frequent form: odd/even drive days based on license plate numbers enforced through police ticketing. If complete compliance occurred, then 50% of all traffic would be reduced on any given day. However, since some trips and personnel are essential, and some people will not comply , the work trip success rate was assumed to be only 25 percent (instead of 50 percent) and the non-work trip success rate was assumed to be 40 percent (only 10% failure-to-comply rate due to cheating or non-work trips by essential personnel). The only effect was assumed to be on single occupant vehicle trips.

Summary of Measures Analyzed - As described earlier, TCMs including CATMATCH, visitor programs, parking pricing, mandatory no-drive days and bicycle incentives were considered. In general, the programs were evaluated at implementation levels that appeared reasonable, based on current agency estimates of effectiveness, or reasonable assumptions based on implementation experience in other nonattainment areas. With the exception of the mandatory program, which was included only to provide an idea of the upper end of the range of TCM effectiveness, the programs resulted in reductions ranging from one or two tenths of a percent to two percent reductions from total on-road motor vehicle emissions. The mandatory program resulted in an 11 - 25 percent reduction, depending on the pollutant, but is not considered a readily available program, for obvious reasons.

The remainder of this section documents assumptions and emission benefits for each TCM evaluated.

MEASURE TITLE: CATMATCH
CATEGORY TYPE: TCMs

NARRATIVE DESCRIPTION

The CATMATCH program is the RTC's voluntary employer-based trip reduction program. The program is based on an intensive public/private partnership with local businesses. RTC staff are currently working directly with 20 local employers representing a significant proportion of Clark County employees. The 20 employers include numerous large casinos and several government agencies. Benefits to employers include a federal tax credit for each participating employee as well as reduced need for maintaining employee parking spaces and increased morale through participation in programs involving more flexible work hours and decreased stress associated with commuting on heavily congested travel routes. The following participation rates are anticipated by the RTC:

CATMATCH Participation and Resulting Travel Reduction: 2000 - 2025.

Year	Employees Participating	Total Employment	Percent Employees Participating	Trips Reduced	VMT Reduced
2000	2,500	790,564	0.3	3,600	27,000
2005	15,000	870,774	1.7	20,000	150,000
2010	20,000	935,973	2.1	30,000	225,000
2015	22,500	1,001,390	2.2	33,500	251,250
2020	25,000	1,056,511	2.4	37,000	277,500
2025	27,500	1,110,529	2.5	41,500	311,250

METHODOLOGY FOR ANALYSIS

Emissions
CATMATCH program participation rates currently anticipated by the RTC were used to estimate emission reductions from that program. The RTC estimates are not available for 2015 or 2025 and were interpolated (2015) or extrapolated (2025). The participation rates were expressed in terms of reductions in trips and vehicle miles traveled and multiplied by the appropriate emission factors calculated as described earlier.

Cost
The cost of the program to the RTC is $911,000 per year. Since the program is voluntary, it is assumed that costs and benefits are about equal for the employers, so no additional cost is assumed for employers.

RESULTS

Emissions
Emission reductions are expected for THC, CO, NOx, and PM emissions from this rule. The following table documents calculated emission reductions.

Average Daily Emission Reductions Resulting From CATMATCH Program: 2000 - 2025 (TPD)

Year	VOC	NOx	CO	PM (Exhaust)
2000	0.05	0.04	0.28	0.0008
2005	0.21	0.16	1.33	0.004
2010	0.24	0.15	1.46	0.005
2015	0.21	0.10	1.44	0.005
2020	0.20	0.08	1.51	0.006
2025	0.21	0.07	1.68	0.007

Cost-Effectiveness ($/ton VOC+NOx+CO/7)
Cost-effectiveness ranges from $19,201 (at initial implementation in 2000) to $4,800 (in 2025 at maximum implementation.

Technical Implementation Feasibility
This measure is currently being implemented and implementation over the next twenty years appears to be feasible.

RESPONSIBLE AGENCY FOR IMPLEMENTATION
The Regional Transportation Commission, partnered with participating employers.
POLITICAL/SOCIAL/PUBLIC ACCEPTANCE
The measure appears to have high political and social acceptability.

MEASURE TITLE: VISITOR PROGRAMS
CATEGORY TYPE: TCMs

NARRATIVE DESCRIPTION

A program providing additional transit and shuttle services to visitors, and thus, reducing the amount of visitor travel via private auto was modeled. The program provided for a goal of a two percent reduction in visitor rental auto trips in the year 2010 and a five percent reduction in the year 2020. The following trips and VMT would be reduced.

Effects of a TCM Program for Visitor Travel on Travel and Emissions.

Variable Reduced	2010	2020
Trips	5,284	15,654
VMT	39,634	117,408

METHODOLOGY FOR ANALYSIS

Emissions
Visitor travel activity was reduced according to the goal of two percent in 2010 and five percent in 2020. The resulting trips and VMT were multiplied by the appropriate emission factors.

Cost
Costs would be incurred through purchase of additional transit vehicles and associated operating costs as well as public relations activity needed to inform visitors of additional transportation opportunities. The RTC's most recent transportation plan estimates the average cost of a paratransit vehicle (shuttle bus) to be $17,000 and the average hourly operating cost to be $40. Approximately 40 shuttles in 2010 and 120 in 2010 would be needed to service the goals set forth for this program. Operation would be 24 hours a day. If the cost of the buses is simple-annualized over a ten year assumed life, the average annual cost of the buses is $68,000 in 2010 and $204,000 in 2020. Operating costs would be $38,400 per day, or $14,016,000 per year. Additionally it was assumed that a public relations campaign costing $120,000 a year would be instituted. Total costs would then be $14,204,000 in 2010 and $42,372,000 in 2020.

RESULTS

Emissions
Emission reductions are expected for THC, CO, NOx, and PM emissions from this rule. The following table documents calculated emission reductions.

Daily emission reductions from a Visitor Program.

Variable Reduced	2010	2020
VOC (tpd)	0.04	0.085
NOx (tpd)	0.026	0.032
CO (tpd)	0.26	0.64
PM Exhaust (tpd)	Negligible	Negligible

Cost-Effectiveness ($/ton VOC+NOx+CO/7)
Cost-effectiveness ranges from $373,789 in 2010 to $557,526/ton in 2020.

Technical Implementation Feasibility
This measure is technically reasonable to implement.

RESPONSIBLE AGENCY FOR IMPLEMENTATION

The Regional Transportation Commission, partnered with participating hotels and visitor centers would likely be the appropriate implementing agency.

POLITICAL/SOCIAL/PUBLIC ACCEPTANCE

Acceptance may be limited by the low cost-effectiveness of this measure as modeled.

MEASURE TITLE: PARKING PRICE INCREASE
CATEGORY TYPE: TCMs

NARRATIVE DESCRIPTION

The parking pricing program was originally analyzed as a category of congestion pricing in the 1998 TCM study. In that study assumptions regarding the costs per trip for residents and non-residents, as well as parking charges, were input into the transportation model to estimate the effect of an increase in parking prices. The measure was modeled for four different population levels, which corresponded reasonably well to current (early 2000) population estimates for the years 2000, 2010 and 2025. The report did not document actual change in VMT but did report percentage changes in CO, which are linearly related to VMT. For the purpose of estimating the magnitude of potential effects, the CO changes were converted to VMT changes. Changes in the number of trips were estimated by dividing the VMT reduction by the 7.5 mile average trip distance. The following reductions resulted:

VMT and Trip Reductions Resulting from Implementing Parking Price Program

Year	VMT Reduction	Trip Reduction
2000	465,760	62,101
2010	895,960	119,461
2025	1,446,797	192,906

METHODOLOGY FOR ANALYSIS

Emissions
VMT and trip reductions were multiplied by the appropriate emission factors.

Cost
The cost of the program was originally estimated at $1.75 per trip avoided. Thus, costs are $108,676 per day in 2000; $209,067 per day in 2010 and $337,586 per day in 2025.

RESULTS

Emissions
Emission reductions are expected for THC, CO, NOx, and PM emissions from this rule. The following table documents calculated emission reductions.

Emission Reductions (tpd) Resulting From a Parking Price Increase.

Year	VOC	NOx	CO	PM (Exhaust)
2000	0.89	0.65	4.80	0.02
2010	0.95	0.59	5.82	0.02
2025	0.98	0.35	7.81	0.03

Cost-Effectiveness ($/ton VOC+NOx+CO/7
Cost-effectiveness ranges from $48,821 in 2000 to $137,790 per ton in 2025.

Technical Implementation Feasibility
This measure is probably technically feasible.

RESPONSIBLE AGENCY FOR IMPLEMENTATION

The Regional Transportation Commission in collaboration with the affected cities.

POLITICAL/SOCIAL/PUBLIC ACCEPTANCE

Medium to low

MEASURE TITLE: MANDATORY NO-DRIVE DAY PROGRAM
CATEGORY TYPE: TCMs

NARRATIVE DESCRIPTION

For the purposes of evaluating a program representing a maximum amount of benefit from TCMs, a mandatory no-drive day program was modeled. Modeling this program is not intended to imply that it is feasible to implement such a program. However, modeling such a program is important simply to provide an idea of the high end of the range of how beneficial TCMs can be.

It was assumed that an odd/even no-drive day was implemented, based on the last number of vehicle license plates. Ideally this would remove 50% of vehicles on any given day. However, essential personnel like fire and police, as well as delivery, postal trucks, utility vehicles, and interstate trucking are not necessarily able to curtail driving habits. Therefore, it was assumed that the program would be effective for about half of affected work trips and about 80 percent of affected non-work trips. Therefore, on a given day, the program was assumed to reduce 25 percent of work trips (one half of the 50% of affected vehicles) and 40 percent of non-work trips. These assumptions were applied to the years 2000, 2010, and 2020. Resulting trip and VMT reductions are listed in the table below.

Trips and VMT Reduced from a Mandatory No-Drive Day

Year	Daily VMT Reduced	Daily Trips Reduced
2000	6,226,343	830,179
2010	9,210,814	1,228,109
2020	11,719,575	1,562,610

METHODOLOGY FOR ANALYSIS

Emissions
Trip and VMT reductions were multiplied by appropriate emission factors.

Cost
No cost estimates were prepared for this program. It is not likely to be feasible. Costs would include enforcement and administration but would likely be offset by avoided costs resulting from driving less, reduced parking costs, lower road maintenance costs and potentially even lower road construction costs.

RESULTS

Emissions
Emission reductions are expected for THC, CO, NOx, and PM emissions from this rule. The following table documents calculated emission reductions.

Emission Reductions (tpd) Resulting from a Mandatory No-Drive Day.

Year	VOC	NOx	CO	PM (Exhaust)
2000	11.93	8.76	64.21	0.21
2010	9.85	6.04	59.89	0.20
2020	8.53	3.24	63.66	0.26

Cost-Effectiveness ($/ton VOC+NOx+CO/7)
Not calculated.

Technical Implementation Feasibility
Very low.

RESPONSIBLE AGENCY FOR IMPLEMENTATION

The program would require legislation at the state level, which could delegate implementation authority to a local agency such as the RTC.

POLITICAL/SOCIAL/PUBLIC ACCEPTANCE

Very low.

MEASURE TITLE: BICYCLE INCENTIVES
CATEGORY TYPE: TCMs

NARRATIVE DESCRIPTION

This measure was not evaluated quantitatively due to low emission reductions and interactions with other programs. Study of the 1998 TCM report, as well as the experience of other U.S. areas showed that as a single measure, bicycle incentives would produce smaller results than the visitor program, which was itself under the threshold set by the criteria described earlier in this section. Therefore, although bicycle programs such as paths, lockers and showers at workplaces, and bike racks on transit buses are essential components of a program designed to reduce vehicular trips, such programs are best evaluated as a group, for example in the manner of the CATMATCH program.

METHODOLOGY FOR ANALYSIS
Emissions Not evaluated. **Cost** $53,000 a day, based on estimates in the 1998 study.
RESULTS
Emissions Less than 0.05 tons per day. **Cost-Effectiveness ($/ton VOC+NOx+CO/7)** Not calculated. **Technical Implementation Feasibility** This measure is currently being implemented and appears feasible.
RESPONSIBLE AGENCY FOR IMPLEMENTATION
The Regional Transportation Commission.
POLITICAL/SOCIAL/PUBLIC ACCEPTANCE
The measure appears to have high political and social acceptability.

Fuels Measures

Summaries of the fuel related control measures are presented below. The measures evaluated in this category were:

- Reducing summertime gasoline volatility;
- Requiring the use of California Phase 3 gasoline;
- Requiring the purchase of new natural gas fueled light-duty vehicles for use in fleet operations;
- Requiring the use of California diesel fuel;
- Requiring the use of "ultra-low" sulfur diesel fuels;
- Requiring the use of diesel fuel/water emulsions; and
- Requiring the purchase of new natural gas fueled heavy-duty vehicles for use in fleet operations.

With respect to gasoline-powered vehicles, the control measures evaluated here are primarily intended to lower emissions of ozone precursors (e.g. VOC and NOx). The largest and most cost-effective emission reductions from gasoline-powered on and off-road equipment would be realized from a reduction in the current volatility limit for gasoline sold in the Las Vegas Valley during the summer months from 9 to 7 RVP. As discussed below, this measure would lead to large reductions in VOC emissions from on- and off-road vehicles at a cost of less than $1000 per ton of emissions eliminated. Although unquantified here, there would also be reductions in VOC emissions associated with gasoline distribution and marketing in the Las Vegas Valley.

In contrast to RVP controls, the adoption of California Phase 3 reformulated gasoline specifications for the Las Vegas Valley would be less cost-effective in reducing emissions. One important reason for this is that data regarding the current composition of gasoline sold in the Las Vegas Valley indicate that fuel properties are closer to the Phase 3 gasoline specifications than one might imagine. Another reason is that it was assumed in the baseline for this analysis that future gasoline will comply with recently proposed federal Tier 2 requirements. For off-road sources, due to the fact that most Phase 3 gasoline is expected to contain ethanol, there would be, based on the NONROAD model, a modest reduction in VOC emissions. It should also be noted that the cost-effectiveness ratios associated with Phase 3 gasoline depend directly on the cost of producing that fuel for the Las Vegas Valley, which is uncertain.

Turning to the substitution of new natural gas vehicles for new gasoline powered vehicles, the cost-effectiveness ratios are relatively high owing to the very low emission levels that can be achieved by new gasoline vehicles.

For diesel powered vehicles, the adoption of California diesel fuel requirements in the Las Vegas Valley could lead to reductions in emissions of NOx and PM. However, depending on the properties of diesel fuels currently being marketed in Clark County, the magnitude of the NOx emission reductions is highly uncertain as is the cost-effectiveness of those reductions. Estimates regarding the potential PM emission benefits are less uncertain, but the cost-effectiveness ratios associated with those reductions are very high as are those associated with the use of an ultra low sulfur diesel fuel. It should be recognized however, that ultra low

sulfur diesel fuels may facilitate the use of advanced emission control systems on diesel engines which in turn may allow the adoption of federal emission standards for new engines that are more stringent than those assumed to apply in the baseline inventory for this study.

Another potential control measure that could reduce NOx emissions from diesel powered vehicles is the use of diesel fuel/water emulsions. However, the cost-effectiveness ratio of this measure is also relatively high, particularly for on-road diesel engines, and there could be a number of issues associated with the implementation of this measure.

Finally, although the repowering of existing diesel HDDVs to the use of natural gas appears to relatively cost-effective for those fleet vehicles where it would be practical, the purchase of new natural gas HDDVs instead of new diesel HDDVs is much less cost-effective. This result is due in part to the fact that new diesel engines will be required to meet more stringent NOx standards beginning in 2003 that reduce the emissions differential between the two types of engines. This coupled with the higher cost of natural gas engines and the cost of developing a refueling infrastructure leads to the high cost-effectiveness ratio estimates.

MEASURE TITLE: SUMMERTIME RVP CONTROLS (TO 7.0 PSI RVP)
CATEGORY TYPE: On-Road Motor Vehicle

NARRATIVE DESCRIPTION

Under this measure, the state of Nevada would adopt regulations setting a maximum summertime RVP limit of 7.0 psi. This measure would impact primarily on-road motor vehicles, although benefits would also be realized for gasoline-fueled off-road equipment. Because of the high summer ambient temperatures in Las Vegas, evaporative hydrocarbon emissions would be significantly reduced by implementing this control measure.

METHODOLOGY FOR ANALYSIS

Emissions

The on-road motor vehicle evaporative HC emission inventory was re-run with MOBILE5b using an RVP of 7.0 psi instead of the baseline value of 8.3 psi. Exhaust correction factors for HC, CO, and NOx were also generated from MOBILE5b. The vast majority of emission reductions associated with this measure is related to decreases in evaporative emissions; this measure has only a small impact on exhaust emissions estimates, as modeled by MOBILE5b.

Cost

The cost for volatility control is estimated to be approximately 1 cent per gallon.

RESULTS

Emissions

Emission reductions are expected for VOC, CO, and NOx from this rule. Based on the 2005 calendar year, the following reductions are expected:

	VOC	CO	NOx
On-Road Motor Vehicles	26%	0.8%	0.4%

In terms of tons of emissions eliminated per day the benefits of this measure would be:

	VOC	CO	NOx
Calendar Year 2005	12.4	3.0	0.19

Cost ($/ton VOC)

The cost-effectiveness of this measure is estimated to be $1,000 per ton of VOC reduced in calendar year 2005.

RESPONSIBLE AGENCY FOR IMPLEMENTATION

The State of Nevada Department of Agriculture.

POLITICAL/SOCIAL/PUBLIC ACCEPTANCE

The transition to lower RVP fuel is not expected to cause any controversy, and it should be implemented with very little impact on the consumer other than the small increase in gasoline cost noted above.

MEASURE TITLE: GASOLINE VOLATILITY REDUCTIONS
CATEGORY TYPE: Nonroad Programs

NARRATIVE DESCRIPTION

Using a lower volatility gasoline such as California gasoline could lower evaporative emissions from nonroad engines. Volatility control by itself is likely to be less expensive than the California fuels because of specific fuel requirements to reduce sulfur levels and toxic emissions and other reductions mainly associated with highway vehicles.

METHODOLOGY FOR ANALYSIS

Emissions

Currently EPA models emission effects of only oxygenate effects and volatility reductions. The oxygen requirement is currently undergoing renewed scrutiny and emission reductions associated with oxygenated gasoline are presented for the current winter oxygenate program in another control option analysis. The effect of oxygenate is modeled as proportional to the amount of oxygen, so the wintertime benefits shown with 3.5 wt.% would be scaled for current summertime oxygen contents of 2 wt.%. However, the emission reductions calculated below are associated only with volatility reductions from 9 RVP (Reid Vapor Pressure scale) to 7 RVP.

Expected Reductions (THC only) are:

Recreational	-15%
Construction	-1%
Industrial	-1%
Lawn & Garden	-3%
Agricultural	-4%
Commercial	-10%
Logging	-1%
Airport GSE	-2%
Recreational Marine	-30%

Cost

The cost of volatility control only is likely to be approximately 1 cent per gallon. The cost of California reformulated gasoline is usually much higher because sulfur, aromatic, and other controls useful for highway vehicles are not projected to result in nonroad emission reductions.

RESULTS

Emissions

For daily summer emission reductions, the percent reduction calculated above is applied to the base 2000 weekday emission inventory to produce a THC emission reduction of 1.9 tons per day with most of the reduction associated with recreational equipment and recreational marine applications. Weekend daily emission reductions will be greater because of the higher activity for recreational sources.

In-Use Year	Summer VOC (tpd)	Summer NOx (tpd)	Summer PM (tpd)	Winter CO (tpd)	Winter PM (tpd)
2005	-1.92	0.00	0.00	0.00	0.00
2010	-1.95	0.00	0.00	0.00	0.00
2015	-2.04	0.00	0.00	0.00	0.00
2020	-2.18	0.00	0.00	0.00	0.00
2025	-2.33	0.00	0.00	0.00	0.00

Cost-Effectiveness ($/ton)

In order to estimate the cost, an estimate of total gallons of gasoline fuel used in nonroad engines was made. To accomplish this estimate, a ratio of gallons of gasoline fuel per ton of NOx from gasoline engines was determined using the NONROAD model to be 37,036 gallons/ton. Applying this to the annual estimate of NOx emissions derived using the NEVES methodology (5% associated with gasoline engines), an estimated 10,200,000 gallons of gasoline fuel will be used in nonroad engines in Clark Co. in 2005.

Calendar Year	VOC	CO	NOx	PM	VOC+NOx	VOC+NOx+CO/7+Avg.PM
2005	150	N/A	N/A	N/A	150	150
2010	160	N/A	N/A	N/A	160	160
2015	160	N/A	N/A	N/A	160	160
2020	160	N/A	N/A	N/A	160	160
2025	160	N/A	N/A	N/A	160	160

RESPONSIBLE AGENCY FOR IMPLEMENTATION

The State of Nevada would have to adopt the California or low volatility regulations for gasoline.

POLITICAL/SOCIAL/PUBLIC ACCEPTANCE

The proximity of other states that may not adopt gasoline requirements may encourage fuel purchases outside the state and transported into Clark Co., however, the price difference is very small. There may be unforeseen difficulties in applying highway gasoline regulations for nonroad gasoline fuel such as is typically found at places like marinas.

MEASURE TITLE: IMPLEMENTATION OF CALIFORNIA PHASE 3 REFORMULATED GASOLINE
CATEGORY TYPE: On-Road Motor Vehicles

NARRATIVE DESCRIPTION

Under this measure, the state of Nevada would adopt regulations requiring the use of gasoline that meets the specifications adopted by the state of California for Phase 3 reformulated gasoline. This measure is evaluated as an increment to more stringent summertime RVP controls, and the reductions associated with this measure are above those that would be realized with a separate RVP rule. Because federal rules cap sulfur at 30 ppm beyond the 2006 timeframe, the benefits of this measure are diminished for 2010 and later calendar years.

METHODOLOGY FOR ANALYSIS

Emissions

Emission reductions were estimated by the CARB predictive model to generate reductions associated with lowering sulfur from 65 ppm (current gasoline) to 15 ppm (CARB RFG3) in 2005 and from 30 ppm (federal requirement) to 15 ppm in 2010. The other fuel parameters that would change as a result of this measure (e.g., aromatics, olefins, etc.) were evaluated with EPA's complex model. Summer and winter estimates were prepared separately because the baseline winter fuel in Las Vegas is akin to CARB Phase 2 RFG and it was assumed that the oxygenate content of winter gasoline would remain at 3.5wt%. Thus, the winter CO benefits resulting from this measure are minimal. As noted above, reductions from lower RVP were estimated separately in the lower RVP control measure.

Cost

The cost differential for CARB RFG3 was estimated to be approximately 6 cents per gallon in the summer and 3 cents per gallon in the winter.

RESULTS

Emissions

Emission reductions are expected for VOC, CO, NOx, and PM from this rule. The following reductions are expected relative to the entire on-road motor vehicle fleet (VOC, NOx, and PM based on summer conditions; CO based on winter conditions):

	VOC	CO	NOx	PM
Calendar Year 2005	5.2%	0.3%	7.7%	5.3%
Calendar Year 2010	3.9%	0.3%	3.7%	1.8%

Cost-Effectiveness ($/ton)

The cost-effectiveness of this measure is outlined below:

	VOC	CO	NOx	PM	VOC+NOx	VOC+NOx+CO/7+PM
Calendar Year 2005	30,000	37,000	19,000	1.9MM	11,300	11,300
Calendar Year 2010	53,000	52,000	57,000	6.6MM	28,000	26,700

RESPONSIBLE AGENCY FOR IMPLEMENTATION

The State of Nevada Department of Agriculture.

POLITICAL/SOCIAL/PUBLIC ACCEPTANCE

The increased cost of gasoline with this measure could be met with a negative response from the public. In addition, it is unclear that California refineries have the necessary capacity to provide CARB Phase 3 RFG to the Las Vegas market.

MEASURE TITLE: IMPLEMENTATION OF CALIFORNIA PHASE 3 REFORMULATED GASOLINE
CATEGORY TYPE: Nonroad Equipment

NARRATIVE DESCRIPTION

Under this measure, the state of Nevada would adopt regulations requiring the use of gasoline that meets the specifications adopted by the state of California for Phase 3 reformulated gasoline. This measure is evaluated as an increment to more stringent summertime RVP controls, and the reductions associated with this measure are above those that would be realized with a separate RVP rule.

METHODOLOGY FOR ANALYSIS

Emissions

The only additional emissions reduction with the implementation of California gasoline for off-road equipment is that resulting from the assumed oxygen content of 2% in summer gasoline. It should be noted that the future of oxygenate usage in California RFG is uncertain.

Cost

The cost differential for CARB RFG3 was estimated to be approximately 6 cents per gallon in the summer or 5 cents more per gallon than the low volatility gasoline. No additional emission benefits are estimated based on the NONROAD model to occur from the use of CARB RFG 3 in the wintertime.

RESULTS

Emissions

Emission reductions are expected for VOC and CO from this rule. NOx emissions are expected to increase but the draft version of the NONROAD model is in error, so no increases are modeled here. The modeled reductions depend on the relatively emissions that come from 2 and 4-stroke gasoline equipment and diesel equipment with percentage reductions shown below.

Calendar Year 2005	VOC	CO
Lawn & Garden	- 2 %	-13 %
Airport Service	- 1	- 9
Recreational Equipment	- 1	-13
Recreational Marine	0	- 6
Light Commercial	- 2	-13
Industrial	- 1	- 5
Construction	0	- 7
Agricultural	- 1	- 10
Logging	0	- 7

For daily summer emission reductions, the percent reduction calculated above is applied to the base 2000 weekday emission inventory to produce a THC emission reduction of 1.9 tons per day with most of the reduction associated with recreational equipment and recreational marine applications. Weekend daily emission reductions will be greater because of the higher activity for recreational sources.

In-Use Year	Summer VOC (tpd)	Summer NOx (tpd)	Summer PM (tpd)	Winter CO (tpd)	Winter PM (tpd)
2005	-0.18	0.00	0.00	0.00	0.00
2010	-0.16	0.00	0.00	0.00	0.00
2015	-0.17	0.00	0.00	0.00	0.00
2020	-0.18	0.00	0.00	0.00	0.00
2025	-0.19	0.00	0.00	0.00	0.00

Cost-Effectiveness ($/ton)

In order to estimate the cost, an estimate of total gallons of gasoline fuel used in nonroad engines was made. To accomplish this estimate, a ratio of gallons of gasoline fuel per ton of NOx from gasoline engines was determined using the NONROAD model to be 37,036 gallons/ton. Applying this to the annual estimate of NOx emissions derived using the NEVES methodology (5% associated with gasoline engines), an estimated 10,200,000 gallons of gasoline fuel will be used in nonroad engines in Clark Co. in 2005.

The cost-effectiveness of this measure is outlined below:	
	VOC
Calendar Year 2005	$8,000 per annual ton
RESPONSIBLE AGENCY FOR IMPLEMENTATION	
The State of Nevada Department of Agriculture.	
POLITICAL/SOCIAL/PUBLIC ACCEPTANCE	
The increased cost of gasoline with this measure could be met with a negative response from the public. In addition, it is unclear that California refineries have the necessary capacity to provide CARB Phase 3 RFG to the Las Vegas market.	

MEASURE TITLE: NATURAL GAS VEHICLE (NGV) FLEET RULE
CATEGORY TYPE: On-Road Motor Vehicle

NARRATIVE DESCRIPTION

Under this measure, public and private fleets of a minimum size would be required to purchase OEM natural gas vehicles. This would generally be limited to light-duty cars and trucks. It is important that conversions not qualify for this program. That is because the durability of most conversions is generally questionable.

METHODOLOGY FOR ANALYSIS

Emissions
Consistent with EPA guidance, it was assumed that NGVs would have exhaust emissions comparable to ULEV levels, and evaporative emissions were assumed to be zero. For this analysis, it was assumed that the NGV would replace a Tier 2 gasoline vehicle, and that only HC and CO benefits would be realized. The benefits were calculated on a per-vehicle lifetime basis, assuming that NGVs would have ULEV HC and CO levels and that the Tier 2 vehicle it replaces would have LEV HC and CO levels. This likely overstates the CO benefits because LEV-category CO emissions are currently assumed to be the same as Tier 1 vehicles. Tighter cold-start controls required for HC reductions are likely to also reduce CO emissions. In this analysis, MOBILE6-based emission factors were used for exhaust emissions estimates, whereas MOBILE5b was used for evaporative emissions estimates.

Cost
The cost for an NGV passenger car relative to a gasoline-fueled vehicle was assumed to be $2,000, while the cost differential for a light-duty truck was assumed to be $2,450. These estimates reflect the cost differential previously estimated by Sierra between a gasoline LEV and an NGV LEV or ULEV.

RESULTS

Emissions
Emission reductions are expected for VOC and CO from this rule. VOC estimates reflect summertime temperatures and fuels; CO estimates reflect wintertime temperatures and fuels. Because much of the VOC reduction is associated with evaporative emissions, estimates were prepared based on both 8.3 psi RVP gasoline and 7.0 psi RVP gasoline. On a per-vehicle lifetime basis, the following reductions were estimated:

	VOC - 8.3 RVP	VOC - 7.0 RVP	CO
Passenger Cars	185 lbs.	106 lbs.	969 lbs.
Light-Duty Trucks	301 lbs.	183 lbs.	1,805 lbs.

Cost-Effectiveness ($/ton)
The cost-effectiveness of this measure was determined by dividing the lifetime reductions above by the cost differential of NGVs relative to a conventionally fueled Tier 2 vehicle. The cost-effectiveness of this measure is presented below. Note that these estimates have not been adjusted to account for seasonal benefits relative to lifetime costs.

	VOC - 8.3 RVP	VOC - 7.0 RVP	CO
Passenger Cars	$21,700	$37,700	$4,100
Light-Duty Trucks	$16,300	$26,700	$2,700

RESPONSIBLE AGENCY FOR IMPLEMENTATION

The State of Nevada or Clark County.

POLITICAL/SOCIAL/PUBLIC ACCEPTANCE

This would likely be met with some resistance by companies forced to participate in the program because of the higher initial cost of new vehicles. In addition, NGV fueling stations are not currently in place to support a large number of NGVs in the fleet.

MEASURE TITLE: IMPLEMENTATION OF CARB "CLEAN" DIESEL FUEL
CATEGORY TYPE: Diesel-Fueled On-Road Motor Vehicle

NARRATIVE DESCRIPTION

Under this measure, the State of Nevada would adopt regulations requiring the use of diesel fuel that meets the specifications adopted by the state of California for "clean" diesel. As an adjunct to this measure, emission reductions were also calculated for a case in which the California specifications are met with a sulfur limit of 15 ppm beginning in 2010.

METHODOLOGY FOR ANALYSIS

Emissions

Two approaches were used to estimate emission reductions for CARB diesel fuel and an ultra low sulfur variant of that fuel. The first approach involved a spreadsheet model previously developed by Sierra to generate the emission reductions (in percent) from CARB diesel relative to a baseline fuel. The baseline fuel specifications were taken from a survey of California refiners that supply non-California diesel fuel. The CARB clean diesel specifications were based on the summer 1999 diesel fuel survey of Los Angeles sponsored by the Alliance of Automobile Manufacturers. Once the percentage reductions were estimated, those were applied to the baseline inventory developed for the Las Vegas metropolitan area to generate a revised inventory.

The second approach used percentage emission reduction estimates developed by CARB staff. In the original rulemaking for the California diesel program, CARB estimated a 7% NOx reduction and 25% PM reduction with the use of California rather than Federal diesel fuel (Original Fact Sheet, 3/97, which accompanied the final rulemaking of June 4, 1997; found at http://www.arb.ca.gov/diesel/diesel.htm).

With subsequent testing, CARB later revised their emission reduction estimates for nonroad diesel engines to those shown in the table below (CARB, 1999). Tier 1 engines are those built before any emission standard was implemented. All on-road diesel engines are Post-Tier 1 for 2005 and later years.

Statewide off-road fuel correction factors
(Federal nonroad and California diesel fuels).

Model Year	NOx	PM
Pre-Tier I	0.9425	0.8749
Post Tier II	0.8012	0.8972

Cost

The cost differential for CARB clean diesel was estimated to be approximately 6 cents per gallon. Lowering sulfur from the 90 ppm level of current CARB clean diesel to 15 ppm was assumed to cost an additional 3 cents per gallon.

RESULTS

Emissions

Emission reductions are expected for VOC, CO, NOx, and PM from this rule. Note that the CO benefits are likely overstated as a result of the use of MOBILE5b CO emission factors for heavy-duty diesel vehicles in the baseline inventory. Also note that these estimates assume that all vehicles are operating on CARB clean diesel. In reality, a substantial fraction of heavy-duty diesel vehicle VMT would likely be from vehicles fueled outside of the Las Vegas area. Lowering sulfur to the 15 ppm level only impacted PM emissions, and those estimates are shown separately below. The following reductions are expected relative to the entire on-road motor vehicle fleet:

	VOC	CO	NOx	PM	PM - 15 ppm S
Calendar Year 2005	-	-	1.5%	8.6%	10.8%
Calendar Year 2010	-	-	1.5%	9.0%	11.3%
Calendar Year 2015	-	-	1.8%	9.0%	11.3%
CARB Estimates	-	-	12.5%	10%	-

Cost-Effectiveness ($/ton)

The cost effectiveness of this measure is outlined below:

	VOC	CO	NOx	PM	VOC+NOx	VOC+NOx+CO/7+PM
Calendar Year 2005	-	-	15,600	193,000	15,600	14,500
Calendar Year 2010	-	-	24,500	230,000	24,500	22,200
Calendar Year 2015	-	-	29,500	243,000	29,500	26,300
CARB Estimates 2005	-	-	1,900	166,000	1,900	1,900
CARB Estimates 2010	-	-	2,900	207,000	2,900	2,900
CARB Estimates 2015	-	-	4,200	219,000	4,200	4,200

Note that the cost-effectiveness of the change from 90 to 15 ppm sulfur was estimated to be $440,000 per ton of PM reduced in 2010.

RESPONSIBLE AGENCY FOR IMPLEMENTATION

The State of Nevada Department of Agriculture.

POLITICAL/SOCIAL/PUBLIC ACCEPTANCE

The increased cost of diesel fuel with this measure could be met with a significant negative response from the trucking industry. In addition, it is unclear that California refineries have the necessary capacity to provide CARB clean diesel to the Las Vegas market.

MEASURE TITLE: CALIFORNIA DIESEL FUEL
CATEGORY TYPE: Nonroad Programs

NARRATIVE DESCRIPTION

Under this measure, the State of Nevada would adopt regulations requiring the use of diesel fuel that meets the specifications adopted by the state of California for "clean" diesel

METHODOLOGY FOR ANALYSIS

Emissions

Two approaches were used to estimate emission reductions for CARB diesel fuel and an ultra low sulfur variant of that fuel. The first approach involved a spreadsheet model previously developed by Sierra to generate the emission reductions (in percent) from CARB diesel relative to a baseline fuel. The baseline fuel specifications were taken from a survey of California refiners that supply non-California diesel fuel. The CARB clean diesel specifications were based on the summer 1999 diesel fuel survey of Los Angeles sponsored by the Alliance of Automobile Manufacturers. Once the percentage reductions were estimated, those were applied to the baseline inventory developed for the Las Vegas metropolitan area to generate a revised inventory.

The second approach used percentage emission reduction estimates developed by CARB staff. In the original rulemaking for the California diesel program, CARB estimated a 7% NOx reduction and 25% PM reduction with the use of California rather than Federal diesel fuel (Original Fact Sheet, 3/97, which accompanied the final rulemaking of June 4, 1997; found at http://www.arb.ca.gov/diesel/diesel.htm).

With subsequent testing, CARB later revised their emission reduction estimates for nonroad diesel engines to those shown in the table below (CARB, 1999). Tier 1 engines are those built before any emission standard was implemented. Virtually all off-road diesel engines are Post-Tier 1 for 2005 and later years.

Statewide off-road fuel correction factors
(Federal nonroad and California diesel fuels).

Model Year	NOx	PM
Pre-Tier I	0.9425	0.8749
Post Tier II	0.8012	0.8972

Cost

The cost differential for CARB clean diesel was estimated to be approximately 6 cents per gallon.

RESULTS

Emissions

Expected emission reductions are shown below and reflect emission reductions across all nonroad categories except aircraft and locomotive. Additional reductions could be applied to locomotive engines if also using California fuel.

Estimates Based on Sierra Model

In-Use Year	Summer VOC (tpd)	Summer NOx (tpd)	Summer PM (tpd)	Winter CO (tpd)	Winter PM (tpd)
2005	0.00	-0.32	-0.21	0.00	-0.11
2010	0.00	-0.25	-0.22	0.00	-0.12
2015	0.00	-0.21	-0.24	0.00	-0.13
2020	0.00	-0.21	-0.26	0.00	-0.15
2025	0.00	-0.22	-0.28	0.00	-0.15

CARB Staff Estimates

In-Use Year	Summer VOC (tpd)	Summer NOx (tpd)	Summer PM (tpd)	Winter CO (tpd)	Winter PM (tpd)
2005	0.00	-2.66	-0.24	0.00	-0.13
2010	0.00	-2.12	-0.26	0.00	-0.14
2015	0.00	-1.75	-0.28	0.00	-0.15
2020	0.00	-1.75	-0.30	0.00	-0.17
2025	0.00	-1.81	-0.32	0.00	-0.18

Cost-Effectiveness ($/ton)

In order to estimate the cost, an estimate of total gallons of diesel fuel used in nonroad engines was made. To accomplish this estimate, a ratio of gallons of diesel fuel per ton of NOx from diesel engines was determined using the NONROAD model at 8165 gallons/ton NOx. Applying this to the annual estimate of NOx emissions derived using the NEVES methodology (95% due to diesel engines), an estimated 42,700,000 gallons of diesel fuel will be used in nonroad (excepting locomotive) engines in Clark Co. in 2005; 47,000,000 in 2010; 50,300,000 in 2015; 54,000,000 in 2020; and 57,500,000 in 2025. The annual additional cost for California diesel used in nonroad engines will then be $2.6 million in 2005. The $/ton estimate will be slightly higher in future years because the NOx emissions per gallon of diesel fuel will be lower as newer engines meet lower emission standards.

Based on Sierra Model Estimates

Calendar Year	VOC	CO	NOx	PM	VOC+NOx	(VOC+NOx+CO/7+Avg.PM)
2005	N/A	N/A	21,700	44,200	21,700	14,840
2010	N/A	N/A	30,000	44,200	30,000	17,000
2015	N/A	N/A	39,200	44,200	39,200	18,000
2020	N/A	N/A	42,500	44,200	42,500	18,000
2025	N/A	N/A	43,300	44,200	43,300	18,100

Based on CARB Staff Estimates

Calendar Year	VOC	CO	NOx	PM	VOC+NOx	(VOC+NOx+CO/7+Avg.PM)
2005	N/A	N/A	2,600	38,000	2,600	2,500
2010	N/A	N/A	3,600	38,000	3,600	3,300
2015	N/A	N/A	4,700	38,000	4,700	4,200
2020	N/A	N/A	5,100	38,000	5,100	4,500
2025	N/A	N/A	5,200	38,000	5,200	4,600

RESPONSIBLE AGENCY FOR IMPLEMENTATION

The State of Nevada would have to adopt the California regulation for diesel fuel.

POLITICAL/SOCIAL/PUBLIC ACCEPTANCE

There were problems with fuel pump leaks during the implementation of the California rule. Also the proximity of other states that may not adopt diesel fuel requirements may encourage fuel purchases outside the state and transported into Clark Co.

MEASURE TITLE: VERY LOW SULFUR DIESEL FUEL
CATEGORY TYPE: Nonroad Programs

NARRATIVE DESCRIPTION

EPA is considering lowering the sulfur level in all fuels, but in diesel fuel specifically to reduce direct PM emissions and also to enable aftertreatment technologies. No specific sulfur levels have been proposed yet; however, the sulfur level is expected to be less than 50 ppm from the current highway levels of less than 500 ppm (see http://www.epa.gov/oms/regs/fuels/diesel/diesel.htm) The emission reductions could be applied to all diesel engines running on this fuel and is likely to result in emission reductions in addition to other methods described here.

METHODOLOGY FOR ANALYSIS

Emissions
The NONROAD model was run with 15 ppm diesel sulfur levels from the 400 ppm average currently.

Cost
Lowering sulfur to 15 ppm was assumed to cost an additional 3 cents per gallon.

RESULTS

Emissions
Only reductions in PM are expected from the use of very low sulfur (15 ppm) fuel versus current fuel at about sulfur levels of 400 ppm with the percentage reductions shown below.

Recreational Equipment	0%
Construction	-2%
Lawn & Garden	-4%
Agricultural	-3%
Commercial	-4%
Logging	-2%
Airport GSE	-2%

In-Use Year	Summer VOC (tpd)	Summer NOx (tpd)	Summer PM (tpd)	Winter CO (tpd)	Winter PM (tpd)
2005	0.00	0.00	-0.24	0.00	-0.13
2010	0.00	0.00	-0.26	0.00	-0.14
2015	0.00	0.00	-0.28	0.00	-0.15
2020	0.00	0.00	-0.30	0.00	-0.17
2025	0.00	0.00	-0.32	0.00	-0.18

Cost-Effectiveness ($/ton)
In order to estimate the cost, an estimate of total gallons of diesel fuel used in nonroad engines was made. To accomplish this estimate, a ratio of gallons of fuel per ton of NOx was determined using the NONROAD model. Applying this to the annual estimate of NOx emissions derived using the NEVES methodology (95% due to diesel engines), an estimated 42,700,000 gallons of diesel fuel will be used in nonroad engines in Clark Co. in 2005. The annual additional cost for very low sulfur diesel used in nonroad engines will then be $1.3 million in 2005. The cost-effectiveness ($/ton) for 2005 are shown below with no change for future year cost-effectiveness.

Calendar Year	VOC	CO	NOx	PM	VOC+NOx	VOC+NOx+CO/7+Avg.PM
2005	N/A	N/A	N/A	90,000	N/A	90,000

RESPONSIBLE AGENCY FOR IMPLEMENTATION

The State of Nevada Department of Agriculture.

POLITICAL/SOCIAL/PUBLIC ACCEPTANCE

There were problems with fuel pump leaks during the implementation of the California rule. Also the proximity of other states that may not adopt diesel fuel requirements may encourage fuel purchases outside the state and transported into Clark Co.

MEASURE TITLE: IMPLEMENTATION OF DIESEL EMULSION
CATEGORY TYPE: Diesel-Fueled On-Road Motor Vehicles

NARRATIVE DESCRIPTION

Under this measure, the State of Nevada (or the County) would adopt regulations replacing current diesel fuel with a fuel/water emulsion, which is expected to result in lower NOx (and possibly PM) emissions. Current formulations use about 15% to 20% of water in diesel fuel. Not surprisingly, there is a reduction in the power of the engines. However, in many demonstration programs, operators do not experience performance problems. This strategy is best suited to fleets that are centrally fueled.

METHODOLOGY FOR ANALYSIS

Emissions
Emission reductions were estimated by applying a 20% reduction to the baseline on-road diesel vehicle NOx inventory. Although there are claims of PM reductions from this strategy, those reductions have not been quantified here because of the uncertainty surrounding those reductions.

Cost
Although the cost per gallon is expected to be the same for a diesel-water emulsion relative to current diesel fuel, there is about a 15% increase in volumetric fuel consumption with the emulsion (i.e., 15% more fuel is needed to travel the same distance). This results in an effective increase in the cost of current diesel fuel of approximately 22 cents per gallon (using $1.48 as the current price of diesel fuel in the western U.S.).

RESULTS

Emissions
Emission reductions are expected for NOx and possibly PM from this measure. The benefits shown below are percentage reductions from the entire on-road motor vehicle inventory. Also, the reductions assume that all diesel-fueled vehicles would operate with the emulsion. In reality, a substantial fraction of heavy-duty diesel vehicle VMT would likely be from vehicles fueled outside of the Las Vegas area. If this measure was applied to fleets only, the overall emission reductions would be reduced significantly.

	NOx
Calendar Year 2005	6.3%
Calendar Year 2010	6.3%
Calendar Year 2015	7.6%

Cost-Effectiveness ($/ton)
The cost-effectiveness of this measure is outlined below:

	NOx
Calendar Year 2005	14,700
Calendar Year 2010	23,000
Calendar Year 2015	27,500

Note that the cost-effectiveness ratios increase in future years as newer, cleaner vehicles are introduced into the fleet and the average baseline per-mile NOx emission rate decreases.

RESPONSIBLE AGENCY FOR IMPLEMENTATION

The State of Nevada Department of Agriculture.

POLITICAL/SOCIAL/PUBLIC ACCEPTANCE

The effective increase in the cost of diesel fuel with this measure would be met with a significant negative response from the trucking industry. In addition, there could be serious concerns regarding the impact that the diesel-water emulsion would have on the durability of engine components.

MEASURE TITLE: DIESEL FUEL/WATER EMULSIONS
CATEGORY TYPE: Nonroad Programs

NARRATIVE DESCRIPTION

Substituting current diesel fuel with a fuel/water emulsion is expected to result in lower NOx and PM emissions. Current formulations use about 20% water in diesel fuel. Not surprisingly, there is a reduction in the power of the engines; however, in many demonstration programs, operators do not experience performance problems. This strategy is best suited to fleets that are centrally fueled, and not likely applicable to all diesel engines operating within Clark Co. Emission reductions on a percentage basis are likely applicable in addition to other measures described here.

METHODOLOGY FOR ANALYSIS

Emissions
Emission reductions were estimated by applying a 20% reduction to the baseline on-road diesel vehicle NOx inventory. Although there are claims of PM reductions from this strategy, those reductions have not been quantified here because of the uncertainty surrounding those reductions.

Cost
Although the cost per gallon is expected to be the same for a diesel-water emulsion relative to current diesel fuel, there is about a 15% increase in volumetric fuel consumption with the emulsion (i.e., 15% more fuel is needed to travel the same distance). This results in an effective increase in the cost of current diesel fuel of approximately 22 cents per gallon (using $1.48 as the current price of diesel fuel in the western U.S.).

RESULTS

Emissions
Emission reductions are expected for NOx and PM emissions from the use of diesel/water emulsions. If applied to all diesel engines the expected emission reductions are shown in the table below.

In-Use Year	Summer VOC (tpd)	Summer NOx (tpd)	Summer PM (tpd)	Winter CO (tpd)	Winter PM (tpd)
2005	0.00	-5.32	-1.05	0.00	-0.58
2010	0.00	-4.23	-1.14	0.00	-0.63
2015	0.00	-3.50	-1.21	0.00	-0.68
2020	0.00	-3.49	-1.30	0.00	-0.73
2025	0.00	-3.62	-1.38	0.00	-0.77

Cost-Effectiveness ($/ton)
For this analysis an assumption is made that a fuel/water emulsion could be employed for all nonroad diesel engines within Clark Co. In order to estimate the cost, an estimate of total gallons of diesel fuel used in nonroad engines was made. To accomplish this estimate, a ratio of gallons of fuel per ton of NOx was determined using the NONROAD model. Applying this to the annual estimate of NOx emissions derived using the NEVES methodology (95% due to diesel engines), an estimated 42,700,000 gallons of diesel fuel will be used in nonroad engines in Clark Co. in 2005. The annual additional cost for diesel/water emulsions used in nonroad engines will then be $10.7 million in 2005. The $/ton estimate will be higher in future years because the NOx emissions per gallon of diesel fuel will be lower as newer engines meet lower emission standards.

Calendar Year	VOC	CO	NOx	PM	VOC+NOx	VOC+NOx+CO/7+Avg.PM
2005	N/A	N/A	6,900	N/A	6,900	N/A
2010	N/A	N/A	9,500	N/A	9,500	N/A
2015	N/A	N/A	12,400	N/A	12,400	N/A
2020	N/A	N/A	13,200	N/A	13,200	N/A
2025	N/A	N/A	13,600	N/A	13,600	N/A

RESPONSIBLE AGENCY FOR IMPLEMENTATION

The State of Nevada Department of Agriculture.

POLITICAL/SOCIAL/PUBLIC ACCEPTANCE

This measure would mainly affect fleet vehicles or equipment based in Clark Co., otherwise there would be no noticeable difference by the public.

MEASURE TITLE: PURCHASE OF NEW NATURAL GAS FUELED HEAVY-DUTY DIESEL VEHICLES (HDDVs) INSTEAD OF NEW VEHICLES WITH DIESEL ENGINES FOR FLEET APPLICATIONS

CATEGORY TYPE: On-Road Motor Vehicle

NARRATIVE DESCRIPTION

Under this measure, a regulation requiring the purchase of new natural gas powered heavy-duty diesel vehicles for use in fleet operations would be implemented. For this analysis, it was assumed that the natural gas powered vehicles would be certified to a NOx standard of 1.8 g/bhp-hr and have an effective PM emission rate of 0.03 g/bhp-hr. The new diesel-fueled engines they would replace were assumed to certified to the 2003 2.5 g/bhp-hr HC+NOx standard. It was also assumed that vehicles participating in this program would operate exclusively in the Las Vegas Valley.

METHODOLOGY FOR ANALYSIS

Emissions

It was assumed that the natural gas engines would be certified to meet a 1.8 g/bhp-hr NOx standard and have effective PM emissions of 0.03 g/bhp-hr. Diesel engines were assumed to meet the new engine certification standards applicable to the 2003 model year. Emission reductions were computed on lifetime basis per vehicle.

Cost

The incremental cost of purchasing a natural gas vehicle was assumed to be $50,000 which includes the costs associated with natural gas refueling infrastructure.

RESULTS

Emissions

Emission reductions are expected for NOx and PM from this rule. On a per-vehicle lifetime basis, the following reductions were estimated:

	NOx	PM_{10}
Natural Gas	0.95 tons	0.14 tons

Cost-Effectiveness ($/ton)

The cost-effectiveness of this measure was determined by dividing the lifetime reductions above by the incremental cost for natural gas engines. The cost-effectiveness of this measure is presented below.

	NOx	PM_{10}	NOx+PM_{10}
Natural Gas	52,600	357,000	45,900

RESPONSIBLE AGENCY FOR IMPLEMENTATION

The State of Nevada or Clark County.

POLITICAL/SOCIAL/PUBLIC ACCEPTANCE

The use of natural gas engines in HDDVs outside of captive centrally fueled fleets would not be feasible without the development of a widespread natural gas refueling infrastructure. It is also expected that subsidies to offset the costs associated with natural gas vehicles would have to be provided to vehicles used in non-governmental fleets.

CONCLUSIONS

As discussed above, there are a large number of potential local additional control measures that could be implemented to reduce emissions from stationary, area, and on- and off-road mobile sources in the Las Vegas Valley. However, as also noted previously, the degree to which the implementation of additional local control measures reductions in emissions other than PM_{10} will be required for the Las Vegas Valley to achieve and maintain compliance with the applicable NAAQS is uncertain at this time.

Beginning with potential additional local control measures targeting PM emissions, the summary of cost-effectiveness ratios for the measures considered here, which is shown in Figure 3-1, indicates that controls on area source emissions are much more cost-effective than are controls on exhaust PM emissions from on- and off-road mobile sources. In addition, as shown in the Task 1 report, reductions in area source emissions are needed based on their contribution to the PM_{10} inventory for the Las Vegas Valley. Therefore, while it may be obvious, efforts in the Las Vegas Valley to control PM emissions should be focused on area sources. Additional measures targeting reductions in PM emissions from stationary sources or from exhaust PM emissions from on- and off-road mobile sources for purposes of compliance with the PM_{10} NAAQS should be considered only if the need for such reductions can be demonstrated once the reductions achievable from area sources have been taken into account. However, the need for local measures targeting PM reductions from these sources may be different if the Las Vegas Valley is found to be in nonattainment with a $PM_{2.5}$ NAAQS or if it is determined that reductions in diesel PM emissions are warranted based on other considerations.

Turning next to potential additional control measures targeting CO emissions, the summary of cost-effectiveness ratios for measures evaluated in this study shown in Figure 3-2 indicates that additional reductions in emissions from large spark ignited off-road engines would be the most cost-effective measure followed by improvements in the Clark County I/M program for on-road vehicles. Given the large potential emission reductions available from I/M program improvements and the fact that these reductions would be available in the near term, it would appear that this would be the most appropriate local control measure to implement if additional reductions in CO emissions are demonstrated to be required.

Moving on to the ozone precursors, VOC and NOx, the summaries shown in Figures 3-3, 3-4 and 3-5 indicate that there are a number of local control measures targeting VOC and NOx emissions from on- and off-road mobile sources that could be implemented if there is a need for additional reductions. However, it must be stressed that the issues identified with the stationary and area source inventories for these pollutants should be addressed and potential additional local control measures for these sources evaluated prior to the implementation of additional local controls on mobile source emissions. Of the mobile source measures, a reduction in summer gasoline RVP levels would lead to large and cost-effective reductions in VOC emissions. Implementation of California standards for large spark ignited off-road engines appears to have the potential to cost-effectively reduce both VOC and NOx emissions. For NOx emissions there are various measures targeting existing HDDVs that appear to be cost-effective.

Finally, Figure 3-6 presents the relative ranking of all of the measures evaluated in this study based on the multi-pollutant rating criteria used by the California Air Resources Board.

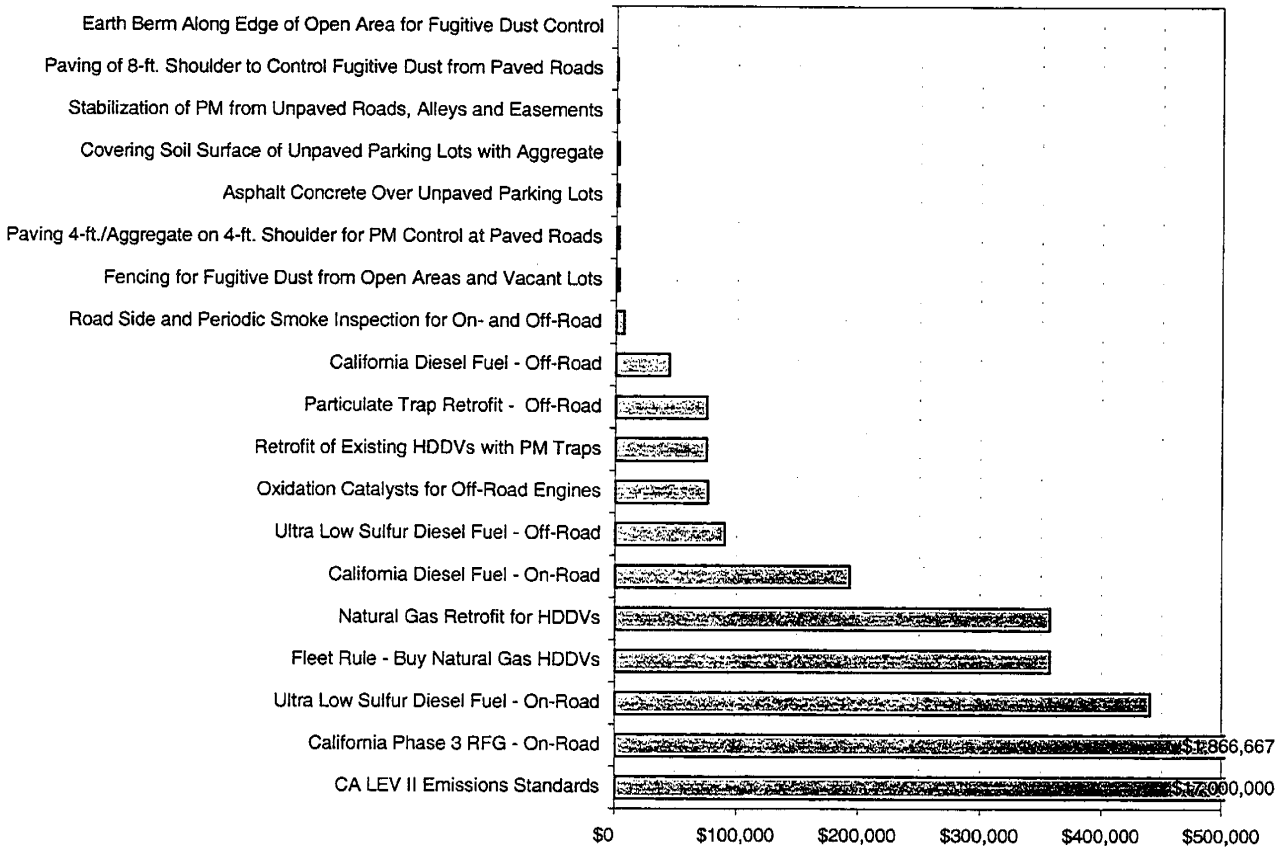


Figure 3-1. Cost-effectiveness ratios ($/ton) for PM control measures.

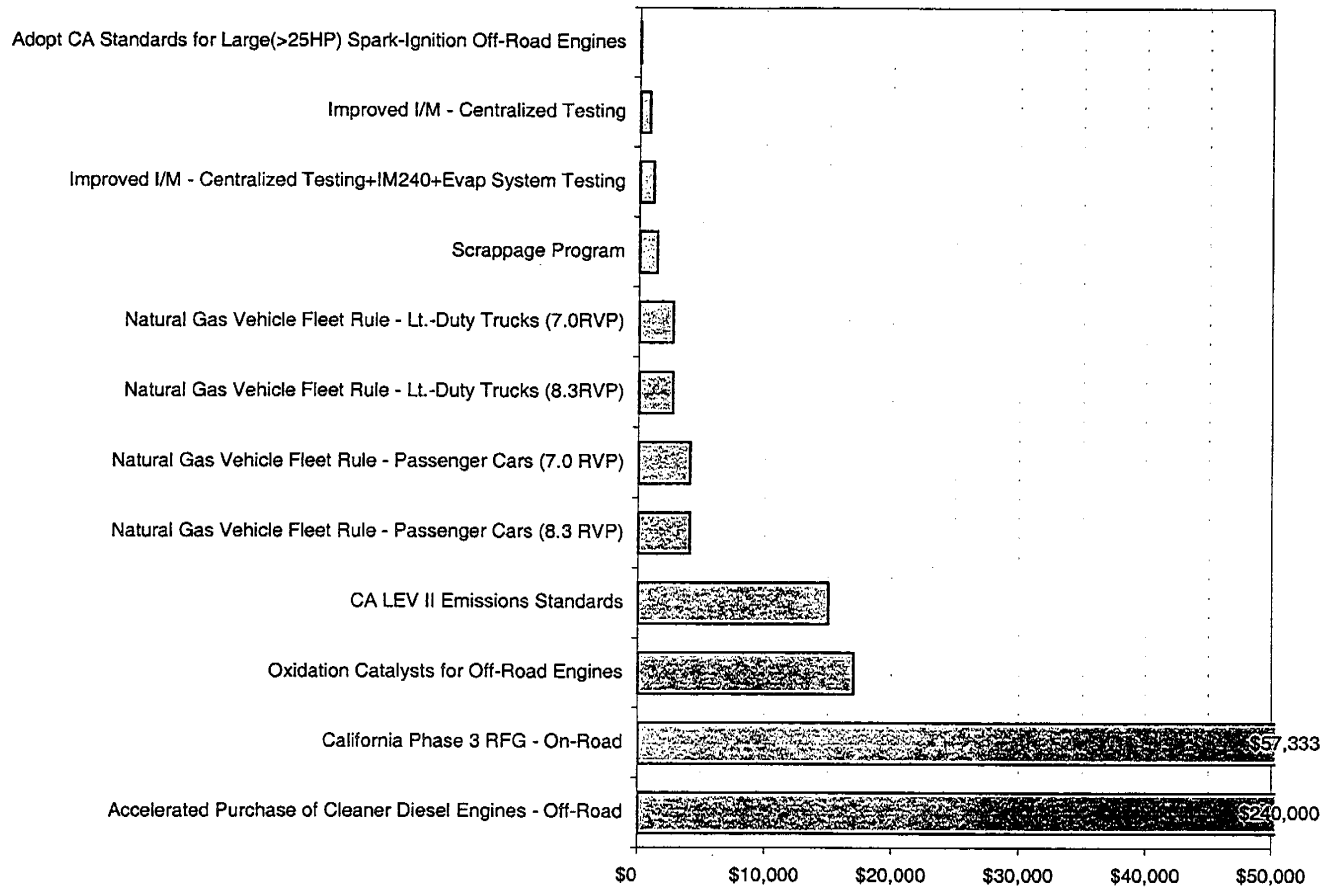


Figure 3-2. Cost-effectiveness ratios ($/ton) for CO control measures.

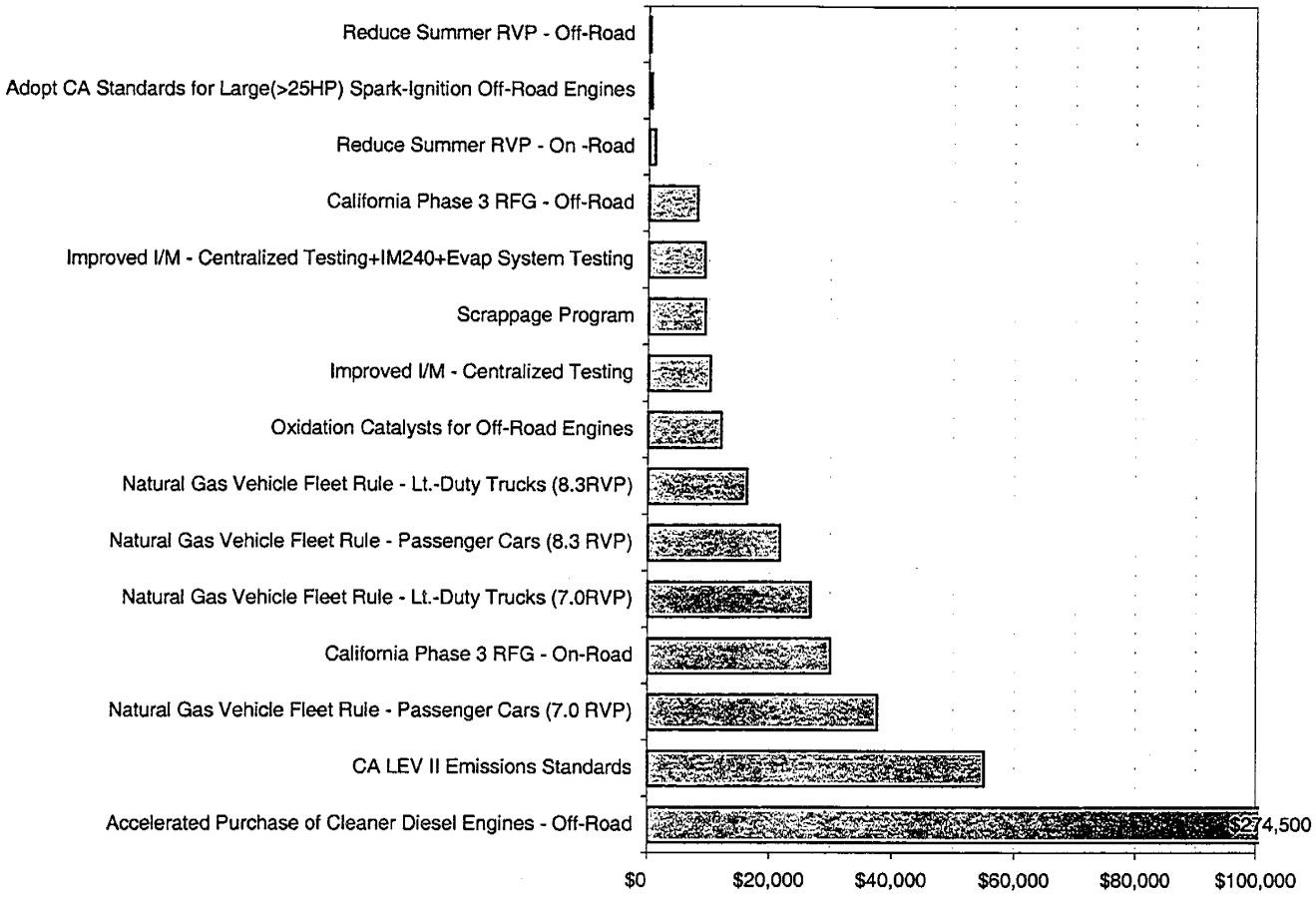


Figure 3-3. Cost-effectiveness ratios ($/ton) for VOC control measures.

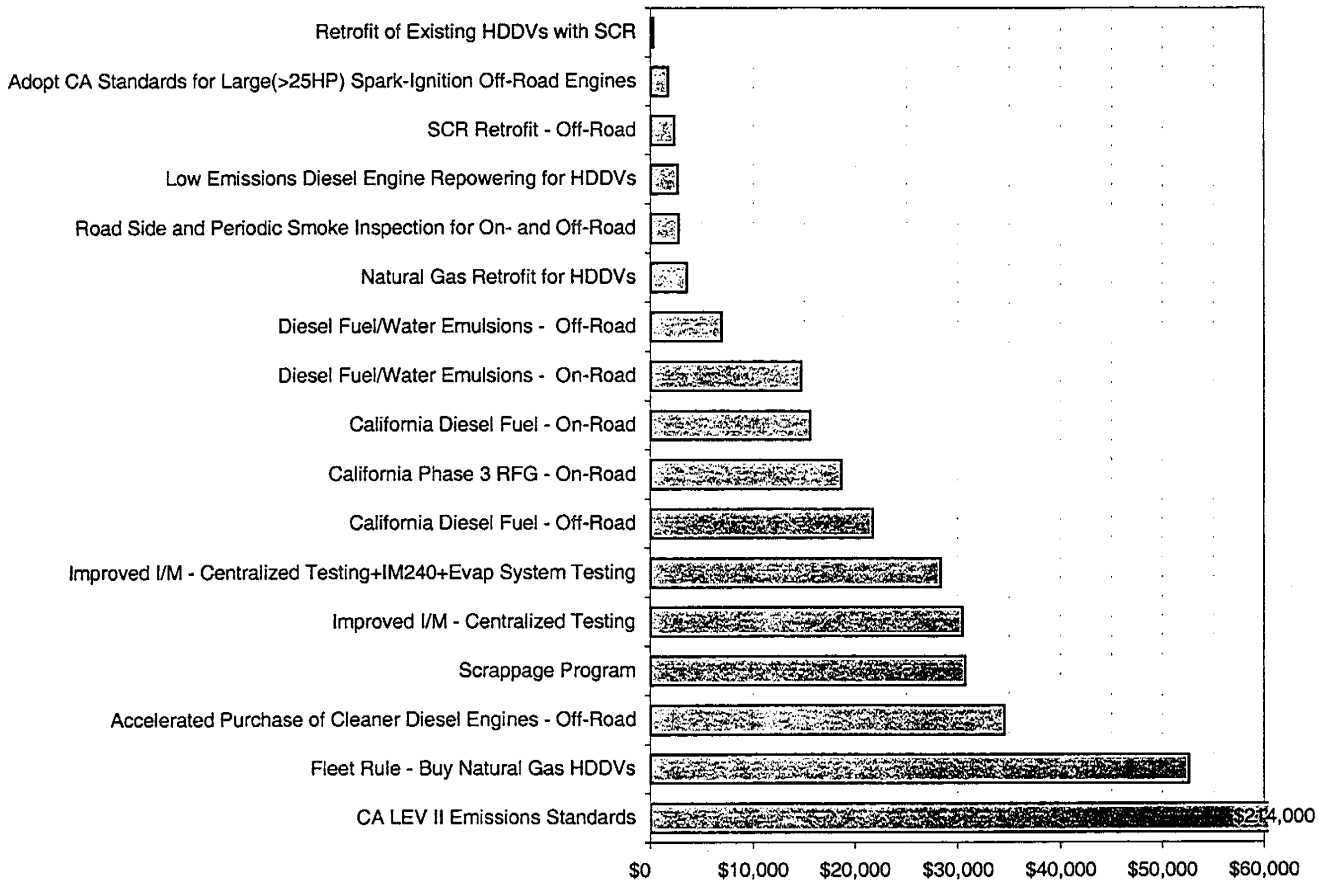


Figure 3-4. Cost-effectiveness ratios ($/ton) for NOx control measures.

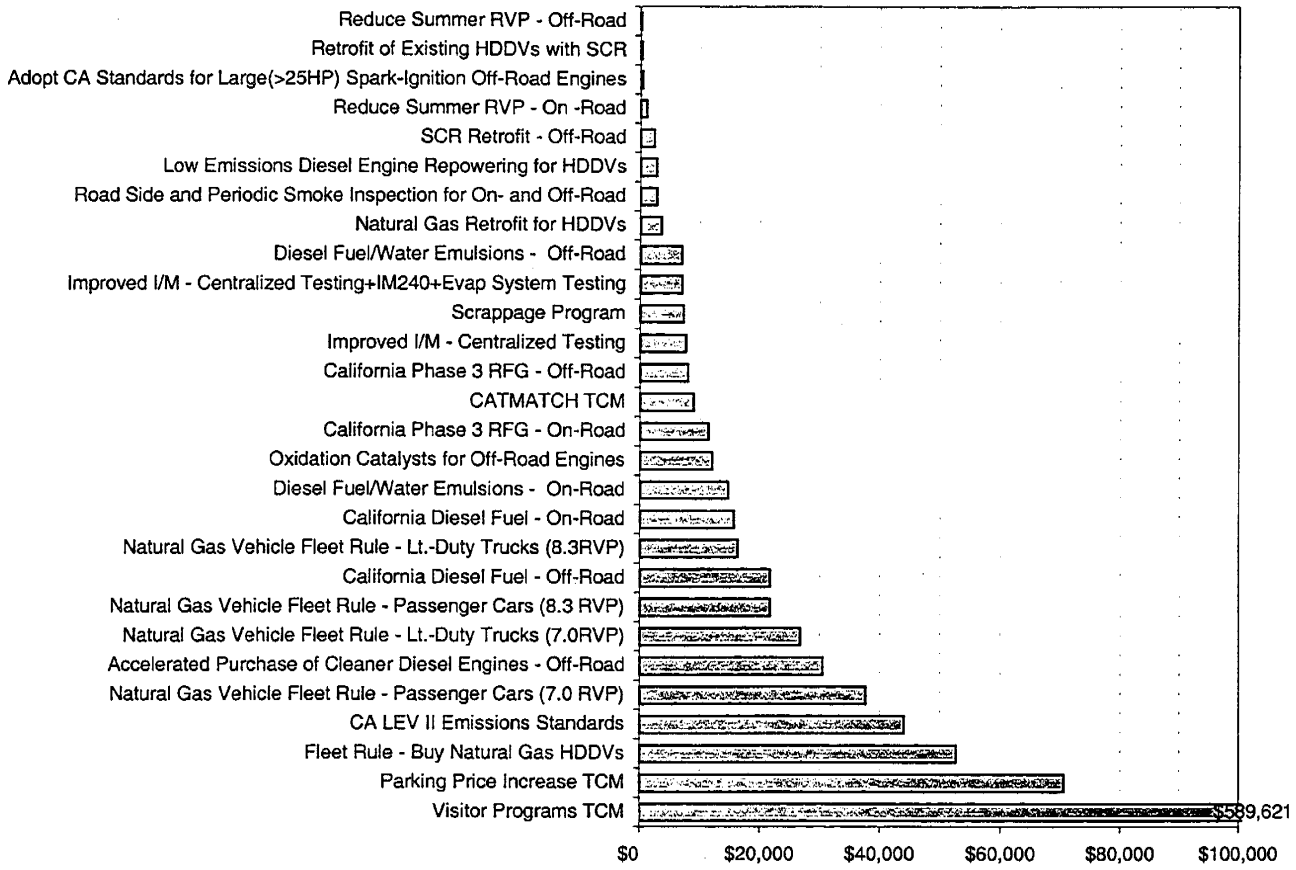


Figure 3-5. Cost-effectiveness ratios ($/ton) for VOC + NOx control measures.

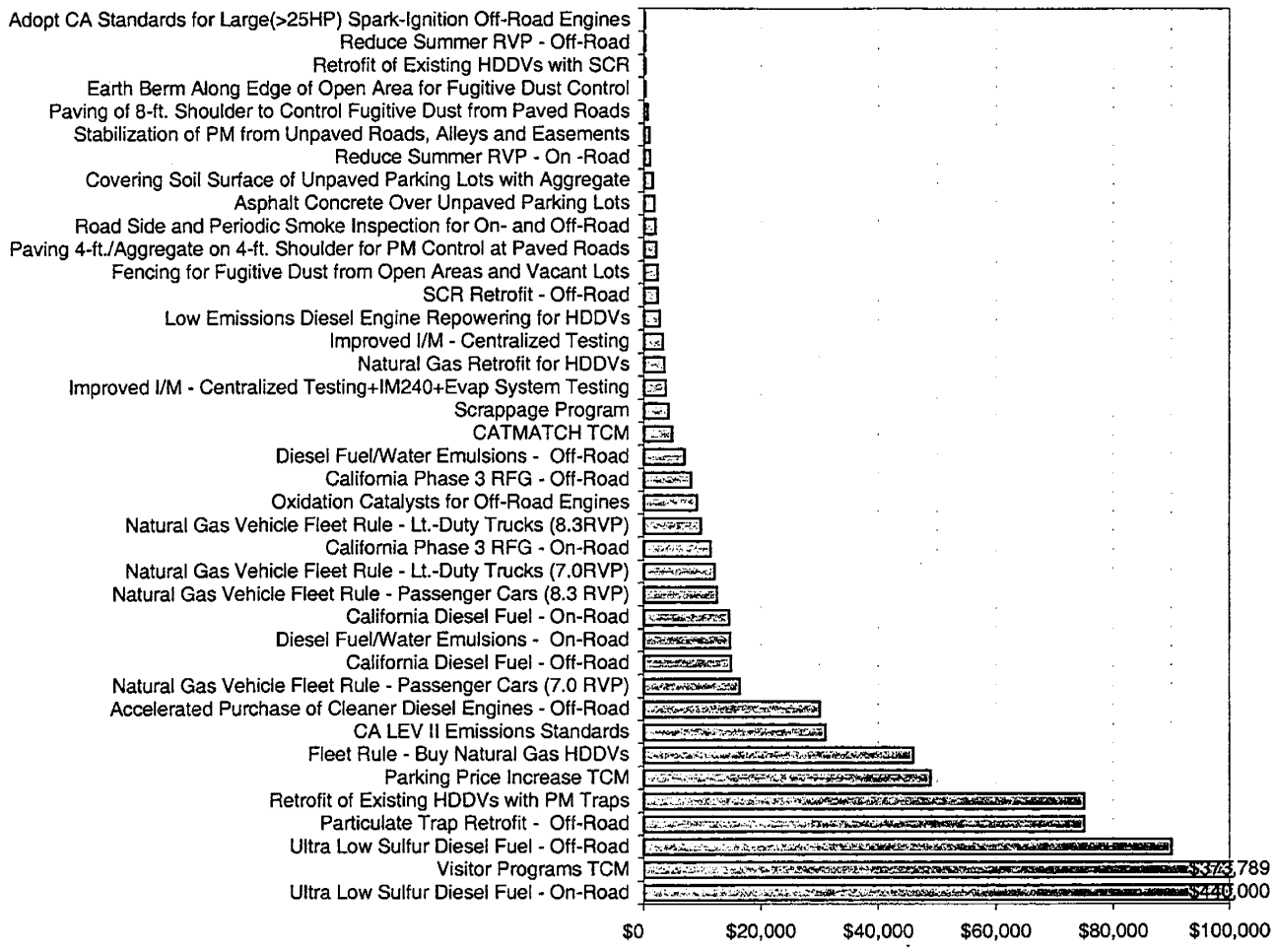


Figure 3-6. Cost-effectiveness ratios ($/ton) for combined pollutants control measures.

4. CURRENT AND FUTURE FUNDING REQUIREMENTS FOR AIR QUALITY PROGRAMS IN CLARK COUNTY, NEVADA

INTRODUCTION

An adequate level of funding is a prerequisite to an effective air program. Reliable monitoring equipment, current computer hardware and software and access to state-of-the art analytical services are important needs. But the primary benefit of adequate funding is the acquisition and retention of staff. Air agencies cannot be effective unless they are staffed by proficient, well trained, professional employees. Most air agency positions require education in engineering or the physical sciences. Many need good communication and inter-personal skills. Air agency staff needs to interact effectively daily with peers in private industry, public interest groups and other government entities. Other government agencies and the private sector provide stiff competition for people with high level qualifications. To attract and retain good people, air agencies must provide adequate pay and benefits, give employees up-to-date equipment to work with, and house them in a decent physical work environment that does not reduce their effectiveness.

To support ongoing air program activities such as air monitoring, permitting and enforcement, agencies need reliable sources of funding that provide revenue each year at reasonably consistent levels. Agencies cannot retain qualified staff, make necessary capital expenditures, or carry out multi-year activities without stable funding. Because many government revenue sources track fluctuating economic conditions, it is prudent to have several sources that are earmarked for air quality and can be combined to achieve stable overall funding from year to year.

Good revenue sources should be relatively free of limitations on their use. If funds come with too many conditions or "strings" attached, governing boards and staff managers are deprived of the flexibility to adjust expenditures to respond to shifting priorities or deal with unexpected issues. Over-dependence on short-term, special purpose grants and similar funding sources can distort program priorities.

Good funding sources are often related to the emission sources and public activities that produce air pollutants. Such funding principles as "the polluter pays" are important to gaining public acceptance and political support.

In work represented in this chapter, the current funding sources for air pollution and transportation programs in Clark County were reviewed and then funding sources used by other air pollution control agencies throughout the U.S. were examined. Special emphasis is given to the nationally recognized California program, which combines State and local agency efforts to fund the implementation of air quality programs to alleviate that state's very adverse air pollution problem. Also reported are the findings from a series of interviews regarding funding that were conducted with numerous stakeholders in the Las Vegas air pollution program. Criteria to examine potential new revenue sources are suggested and used to evaluate our recommendations. Finally, three major recommendations are made on how to provide funding for the proposed programs later identified in Chapter 5, as well as suggestions

of additional areas to examine in the future for potential revenues to support air pollution programs in the Las Vegas Valley.

TECHNICAL APPROACH

In conducting this work, the ENVIRON team closely reviewed the current funding sources for Clark County and the prospects of obtaining increases in future years from these sources, or from additional sources. The Southern Nevada Strategic Planning Authority (SNSPA) needs assessment, which included a mid-1998 evaluation of existing funding sources for air quality activities, was also reviewed and its recommendations considered in Task 3. The funding programs of the United States Environmental Protection Agency (USEPA) were examined. For example, the FY-2000 USEPA Section 105 base grant for Clark County Board of Health is $632,965 and for the Nevada Division of Environmental Protection (NDEP) is $647,486. Additional funds for specific pollutant programs, such as $PM_{2.5}$, are yet to be allocated for FY-2000.

Another area for further examinations was the recently expanded Congestion Mitigation and Air Quality Improvement Program (CMAQ) which is administered by the United States Department of Transportation (US DOT). It is important that Clark County assures the use of CMAQ funds for air quality improvement programs. The team reviewed recent CMAQ funding decisions in Clark County. Clark County has been working with the RTC and local public works departments to commit to pave all the high traffic unpaved roads in the non-attainment area. This will be done in accordance with the SIP.

In addition to specifically focusing on internal funding sources in Clark County, ENVIRON reviewed the experience and funding levels in other fast-growing States and counties in the U.S. to ascertain whether Clark County continues to receive its fair share of Federal funds for air pollution control. ENVIRON examined the Clean Air Act Section 105 allocation formula as it applies to Clark County. In the past, the formula has needed revision to accommodate rapidly growing areas that did not have their current population or increased air pollution levels adequately reflected in the national funding formula. Per capita allocations of Section 105 funds for a number of areas in California were compared with Clark County's allocation.

After reviewing and updating the status of current funding sources for Clark County air pollution programs, ENVIRON examined new opportunities for such funding. For example, the following activities or programs may offer the potential to secure additional funds:

1. The State vehicle Inspection and Maintenance (I/M or sometimes is referred to as the Smog Check) program currently returns $1 from each $5 smog certificate to the county of origin. The funds are then allocated on basis of 60% to the Health District and 40% to the Department of Comprehensive Planning. A concern identified in several interviews was the frequent delays in receiving these funds from the State. Clark County will propose in the next session of the Legislature that they be given dedicated access to this $1 portion of the smog certificate. A second funding source from the smog check program is the Excess Reserve Fund, which is essentially remaining revenue collected after accounting for the administrative fees of running the program. While these two programs generated over two

million dollars for Clark County in FY 1998-99, support for increasing the fee with the extra revenues also returning to Clark County was examined.

2. In some states, notably California, there is an extra "smog fee" added to the annual registration fee for motor vehicles in nonattainment areas. This fee, which is up to $4 in some areas, is given back to the area for use in air quality related activities. Some of the uses have been for alternative fueled public and school buses, outreach, and education programs. ENVIRON explored the need and support for such a program.

3. The concept of a "VMT" (vehicle miles traveled) registration fee, based on the annual vehicle miles traveled, will be examined. This fee is closer to the "user pays" concept and may be perceived as fairer by the public.

4. Current statutes [NRS 445B.500(3)] limit the revenues returned from enforcement penalties to $17,500 annually, even though the 1999 enforcement fees reached over $541,000. As enforcement programs become more aggressive to deal with the county's increasing air pollution problem, perhaps a large or set percentage of the annual fees could be returned to the air pollution control program.

The above are just some examples of the potential sources of revenue that the team examined. To obtain individual views on what sources of funding should be pursued in Clark County, ENVIRON conducted extensive interviews with local, state, and federal stakeholders as described in the next section.

INTERVIEW STRATEGY

Information regarding existing and suggested funding programs was obtained as part of the effort in the SB 432 study to talk with key stakeholders on a variety of topics. Interviews with stakeholders provided valuable information used in developing the recommendations included here. A large number of committed, concerned, experienced and knowledgeable individuals contributed time to preparing for and participating in the interviews, many of which took up to three hours. Thirty nine interviews were held with Clark County stakeholders and key staff. This included 30 personal interviews with stakeholders, consisting of 17 government officials, 10 members of the business community, and three public members. Seven one-on-one personal interviews were held with key technical staff at the CCHD. Finally, two telephone interviews were conducted with key members of the business community who could not be interviewed in person. The objective was to obtain information and opinions from as wide and representative a cross-section of Clark County stakeholders as possible. Interviews were held with personnel and managers of the Department of Comprehensive Planning (DCP), the Air Quality Division of the Clark County Health District (AQD); the Regional Transportation Commission; the Clark County Department of Aviation, the Nevada Department of Environmental Protection (NDEP); the Nevada Department of Transportation (NDOT); the Nevada Department of Motor Vehicles and Public Safety (DMV&PS); representatives from the cities of Las Vegas, North Las Vegas and Henderson; a representative of the Board of County Commissioners; a representative of the Health Board; representatives of business interests and groups such as the contractors association; the homebuilder's association; the Western States Petroleum Association; the Automotive Manufacturers Association; and several

members of the public. The ENVIRON team also met with federal representatives of the USEPA and the United States Department of Transportation (DOT). At each interview ENVIRON requested that the interviewee provide any additional names or organizations whose opinions they believed would be important to reflect in this report. A complete list of all persons interviewed is contained in Appendix A.

Each of the initially-identified interviewees was mailed a letter from Senator Porter requesting support and participation, which was accompanied by a lengthy series of questions developed by the ENVIRON team. Each interview focused on those questions with which the interviewee was most familiar. For most of the interviews, two or more ENVIRON team members were present. The key questions related to funding during the interviews concerned (1) current funding programs for air quality and transportation programs, (2) suggestions for new revenue sources, (3) willingness to pay and the need for greater public contribution, and (4) cost-effectiveness of such current and future programs. Because of the specificity of these particular questions, a more limited number of interviewees provided detailed information than on the questions related to technical and/or institutional issues. Only one member of the public had specific ideas on several of these questions. The results of the interviews are summarized later in this chapter.

CURRENT FUNDING SOURCES

This section examines the current sources of funding to Las Vegas for air pollution, and transportation programs related to air pollution. The information gathered to support this section came from reports, files, and interviews with key state and federal stakeholders as well as discussions with Clark County program personnel. Total annual funding for air pollution programs in Clark County (CCHD-AQD and DCP) is currently slightly greater than $6,000,000.

While most revenues are generated locally for air programs, the US EPA and US DOT do provide considerable funding as well. Figures 4-1 and 4-2 show the sources of revenues for each of the current two key agencies in Clark County with responsibility for air quality management.

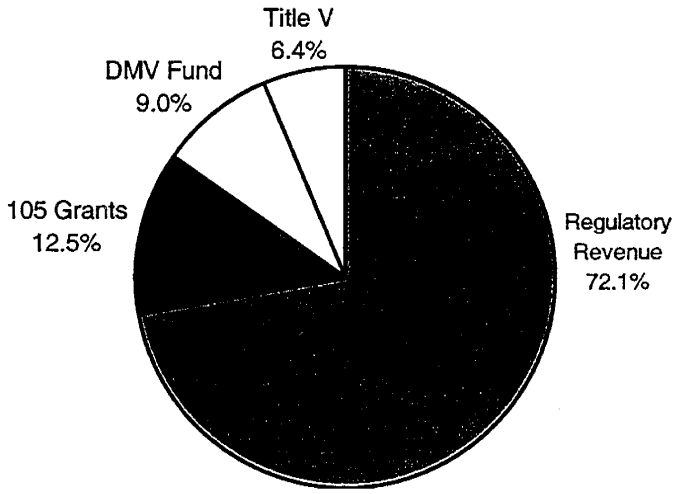


Figure 4-1. Revenue sources for the Air Quality Division, CCHD.

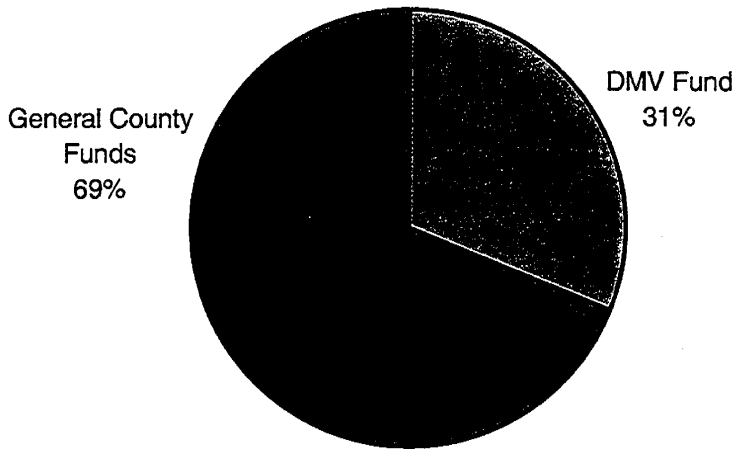


Figure 4-2. Revenue sources for the current Air Quality team of the Clark County Department of Comprehensive Planning (CCDCP).

REVENUES FROM LOCAL PROGRAMS

The extremely rapid growth of Clark County has challenged local officials in providing sources of revenues to maintain a satisfactory infrastructure. While most of the special funding mechanisms identified in this section are used for public works and transportation, they are important models for consideration as the needs for additional air pollution program funds are generated by new demands upon the local agencies. Funding of county agencies such as Comprehensive Planning is primarily from local sources.

The current annual budget of the Air Quality Division (AQD) of the CCHD is $5,083,105. As shown in Figure 4-1, the AQD obtains nearly three-fourths of its operating revenue from various regulatory programs. These revenues come from activities associated with:

- Issuing 160 authority-to-construct permits,
- Issuing 150 operating permits,
- Issuing 2,000 construction (dust) permits,
- Issuing 140 various location permits, and
- Issuing 400 Notices of Violation (NOVs).

Annual operating permit fees from stationary sources provided about $800,000 in 1999 and the federally required Clean Air Act Title V permits program $300-400,000 in revenue. It should be noted, however, that Title V permits are given for five years and thus revenues are dependent on renewal dates that began during the initial round of permitting. It is also important to note that Title V revenues can only cover the actual costs of issuing the permits and cannot be used for other program areas such as monitoring and planning. The current Title V permit fees, after adjusting for the CPI, appear to be at the federal minimum. The fee structure should be examined in relation to Title V permit fee levels in neighboring states.

The largest source of revenue, however, is from sales tax. This totaled about $2,000,000 last year. Special taxes that Clark County has enacted include;

- Motor vehicle registration "privilege" tax of 1 cent per $1 of vehicle valuation [Chapter 482 of the Nevada Revised Statutes (NRS)] and Chapter 4.26 of the Clark County Revenue and Taxation Code (CCRTC);
- Convention and visitors transient room tax (NRS 244A.597 to 244A.655) and Chapter 4.08 of the CCRTC; and
- Real estate property development tax of $500 per new housing unit or 50 cents per square foot of commercial space (CCRTC 4.22.020).

The AQD regulations on construction dust permits have proven to be a major source of funds - $1.2 million in 1999 (CCHD air pollution control regulation 18.3.2). Enforcement fines, as discussed elsewhere in this report, are limited to $17,500 per year and do not presently represent a major source of revenue for the CCHD.

Figure 4-2 shows the funding sources for the Air Quality Team within the Clark County DCP. As it can be seen, over two-thirds of the funding comes from general county revenues and the remaining source is the Department of Motor Vehicles Fund. In 1999, $305,029 was provided the DCP from the return of 40 cents per vehicle inspection from the smog certificates. These funds provide roughly 3.0 Full Time Equivalent (FTE) positions within the Air Quality Team. Total funding available to the Air Quality Team, including contracts, appears to be slightly less than $1,000,000. The Team consists of a manager, two principal planners, four senior planners, a management analyst, and an intern.

Local funding of transportation projects is projected to total $569,858,000 over the next three years. Funding sources are many of the same noted for the AQD – special sales taxes, privilege tax from registration of vehicles, and resort corridor room taxes. This latter tax provided a projected $17.6 million in revenues in FY-2000. The motor vehicle privilege tax provided over $20.2 million in the same period. Another special tax is an extra 0.25% sales tax on fuel that must be used for public mass transit. While most of these funds are used for construction of transportation infrastructure to keep pace with Las Vegas' rapid growth, some of the funds are used on projects that can have benefits for air pollution as well. Examples include transit improvements, synchronization of signals, and the construction of high occupancy vehicle lanes to smooth out traffic flow and reduce motor vehicle emissions due to congestion. It is important to understand the magnitude of the funding that is available for transportation in comparison to the air quality program. Local funding of the air quality program amounts to less than 3% of the local funding for transportation.

There seemed to be a general opinion that although the area's growth certainly will require a large increase in infrastructure and perhaps air quality planning funding over the next twenty years, local business and residents will find ways to raise that revenue to maintain current infrastructure.

STATE OF NEVADA FUNDING SOURCES

Direct funding to the air programs in Clark County from the State is somewhat limited. The FY-00 program budget of $5,083,105 of the Air Quality Division of the CCHD consisted of

10.63% or about $540,300. Revenues from regulatory activities, such as the $1 per vehicle inspected in the state-administered I/M program is returned by the DMV to local air pollution control jurisdictions. This program is generally referred to as "Emission Control Grants" and totaled $762,573 for fees collected in 1998. Of each dollar, 60 cents goes to the CCHD and 40 cents to the Clark County Department of Comprehensive Planning. The I/M program also provides additional funding through the Excess Reserve Grant fund that consists of revenues collected from the inspections that are not need to operate the program.

In the transportation funding area, the State is projected to fund $626.4 million for streets and highways in Clark County during the next three years. A source of revenue is State bonds, a special 10-year revenue bond for use on "super projects" such as the widening of I-15 and the Boulder City bypass. Over the next three years, $242 million is programmed from this NDOT fund for transportation projects in Clark County. Another large source of revenue for state highway projects is the gasoline tax of 17.65 cents per gallon. Over the next three years, Nevada has programmed $217 million from this source for projects and another $296 million is still awaiting programming. Additionally, Clark County phased in during the 1990s a special 5 cents per gallon state gas tax that is used by RTC on transportation projects (Chapter 373 of NRS). Similar to the previous section, the state funding for air quality programs is less than 1% of state funding for transportation.

U.S. ENVIRONMENTAL PROTECTION AGENCY GRANTS

Historically, the major funding source for local air pollution control agencies under the federal Clean Air Act (CAA) has been Section 105 grants for the support of air pollution planning and control programs. These have existed since the original CAA was enacted in 1970, and Clark County has been a recipient each year since that time. They can be awarded for up to 60% of the cost of implementing activities related to the planning, developing, establishing, carrying-out, improving, or maintaining the local control program. While they can reach the 60% level, this rarely occurs in medium to large agencies due to limits in the national funding provided by Congress. In FY 2000, the total allocated to EPA Region 9 (the EPA office that oversees the Clark County program) was $ 25,530,601. While some recipients of Section 105 funds pass a certain portion on to the SIP planning agency (Department of Comprehensive Planning in the case of Clark County), that has not historically been the case in Clark County. The entire grant goes to the CCHD, Air Quality Division. Table 4-1 shows the Section 105 funding history for Clark County since FY-1996, as well as total number of employees identified in the grant application.

Table 4-1. Federal funding for air programs in Clark County, FY-1996 to FY-2000.

Fiscal Year	Base Grant	Mobile Sources	PM_{10}	Air Monitors	TOTAL GRANT	Federally-Identified Employee Positions
1996	$253,609	$160,000	$200,000		$613,609	29.80
1997	$620,923				$620,923	32.40
1998	$591,556			$3,000	$594,556	38.25
1999	$591,756				$591,756	46.25
2000	$632,965			$PM_{2.5}$ $ pending	$632,965	59.50

It should be noted that total approved and funded FTE (full time equivalent) positions in FY 99-00 for the AQD were 67.00. By comparison in 1992 the Air Quality Division had 24 FTE and in 1984, the AQD totaled 16 employees in size.

In addition to the Section 105 grants, there are several additional EPA funding programs that eligible air and transportation planning programs can receive. The Community Based Environmental Protection (CBEP) addresses environmental issues by bringing together public and private stakeholders in a place or community to identify environmental and public health concerns, set priorities, and forge comprehensive solutions. One such program under CBEP is the Sustainable Development Challenge Grant (SDCG). The recently formed Southern Nevada Regional Planning Coalition (SNRPC), which is an association of the four incorporated cities in the Las Vegas Valley, Clark County and the Clark County School District, has applied for an SDCG from EPA for $250,000. With a 44% match of in-kind services by the local agencies, it brings the total project budget to nearly $450,000. EPA has just approved an "offer of funding" to the SNRPC and expects to provide the funds by mid-July. While this is a one-time grant, a developing program by the EPA will provide longer term funding to those recipients who show substantial progress in their initial grant. The goal of this project is to develop an integrated regional plan for southern Nevada that links transportation, land use, and environmental protection. One of the four planning efforts will be promoting transportation alternatives to improve air quality.

Finally, another program that is currently providing about $25,000 annually in federal funds to the Las Vegas area is the Environmental Monitoring for Public Access and Community Tracking (EMPACT) program. Local governments and tribes are eligible to apply. The Las Vegas program is managed by EPA's Las Vegas Laboratory, and the local partners are Clark County, the City of Las Vegas, the University of Nevada-Las Vegas, the Desert Research Institute, and the National Weather Service-Las Vegas office. This is a multimedia project to collect and communicate timely information about air quality, water quality, and meteorological data for the Las Vegas metropolitan area. The air quality aspect involves reporting CO, PM_{10}, and ozone data on an hourly basis.

One other EPA funding program which has not been pursued by Las Vegas agencies is the Environmental Education (EE) grant program.

U.S. DEPARTMENT OF TRANSPORTATION FUNDING PROGRAMS

The U.S. Department of Transportation, through its agencies such as the Federal Highway Administration (FHWA), the Federal Transit Administration (FTA), and the Federal Aviation Authority (FAA) provide considerable funding to the infrastructure of Clark County. The projects funded through these programs have a definite impact on air quality in the Las Vegas Valley, both positive and negative.

The most significant funding program from US DOT that directly affects air quality planning is the Congestion Mitigation and Air Quality Improvement (CMAQ) program. CMAQ was introduced in the 1991 federal transportation legislation known as the Intermodal Surface Transportation Efficiency Act (ISTEA). Total national funding of CMAQ under the 1991 legislation was nearly $6 billion. The program was re-authorized and expanded under the

1998 Transportation Equity Act for the 21st Century (TEA 21). The program is focused on providing funds to help fulfill CAA mandates in nonattainment areas such as Clark County in achieving the NAAQS. Available CMAQ funds for Clark County were $4,900,000 in FY-98, and $6,300,000 in FY-99 and FY-00. However, as in the case of many of the DOT funding allocations to Clark County during the past three years, a considerable portion was unprogrammed (not project-specific identified) and therefore not used yet. The CMAQ budget for FY-01 and 02 is $6,138,100 per year. Past use of these funds in Clark County have paid for constructing pedestrian over-crossings of busy intersections to reduce auto congestion on the Strip, upgrading the computer traffic signal synchronization, and planning for fixed and light rail transit projects. This year, the CMAQ funds will be used for conducting an environmental study of a high-speed train between Las Vegas and Southern California ($2 million), support of the Citizens Area Transit carpool/bus matching program (CATMATCH) - $911,000, and more support for signal synchronization, peak hour express bus service, dual left-hand turn lanes, and improvement in passenger rail service operations. As noted in Task 2, immediate air quality benefits from transportation control measures such as these are relatively minor.

Federal funding for street and highway projects is projected by the RTC's Transportation Improvement Program (TIP) to total nearly $511.5 million in FY-00 to FY-02. This constitutes significant funding that may be subject to potential USEPA highway sanctions. The State (and Federal) highway managers believe that this money could temporarily be moved to other project categories. These categories might include projects that would have a more definite impact on improving air quality.

The FTA will provide funding of about $80 million over the next three years, mostly for capital improvements. Total operating and capital funding, FY-00 to 02, is projected at $340.8 million by the RTC's TIP. A large part of the transit program expenditures should have secondary, positive impacts on air quality. The FTA, in 1999, did award funds to the Desert Research Institute for a 2.5 year study to (1) develop and test LIDAR-based on-road sensors for transportation-related PM, (2) create GIS-based transportation emissions model for Las Vegas, and (3) determine the frequencies and magnitudes of $PM_{2.5}$ transported into the Las Vegas area.

Federal transportation funding, however, is expected to continue to grow as this is a very high priority among the nation's infrastructure needs. TEA 21 increased the amount and eligibility of projects for receiving CMAQ funds, and as the number of areas with serious air pollution problems decline nationwide it is likely that the remaining problems, such as in Clark County, will get a growing share of the funds. Federal funding for air pollution in Clark County is only 0.3% that of federal funding of transportation programs.

The opinions gained from interviews with Federal highway officials were that there was no lack of adequate funding for highways and transit projects in Las Vegas. Thus, should some form of transportation control measures need to be incorporated into a future control strategy, they would be quite feasible from a funding standpoint.

FUNDING SOURCES USED BY OTHER AIR PROGRAM AGENCIES

CALIFORNIA AGENCIES

California has 35 local and regional air pollution control agencies (commonly referred to as districts) of varying sizes. Because of their number and variety, California agencies provide a rich source of information on funding mechanisms. California has a number of agencies that stand out nationally for their size, technical and programmatic sophistication, and level of funding. Regardless of their size, all California agencies rely extensively on locally generated revenues and receive some funding from the state. Larger air districts with violations of national standards also receive federal funds.

California air districts depend heavily on permit and permit-related user fees. For a number of districts, these fees are the sole source of local funding. California air districts issue construction permits to facilities when they propose to install or modify equipment that emits air pollutants. Construction permits are converted into operating permits once equipment is installed. Operating permits are renewed periodically - on an annual basis in many districts. Only very small equipment is exempt from permit requirements. Facilities whose emissions exceed locally prescribed levels are subject to special new source review requirements. Thresholds for new source review are usually much lower than thresholds specified in federal law. Facilities with total emissions exceeding specified federal thresholds are issued "Title V" permits.

Fees are charged for a wide variety of permit-related activities. Fees are charged for all new permits, permit modifications and renewals. Fees are also charged for related services, such as reviewing applications to bank or transfer emission reduction credits and for asbestos and lead abatement activities. Permits that involve extra levels of review, like those related to the emission of hazardous air pollutants, are sometimes charged higher fees. Some districts have actually tracked hours spent on more complex review efforts and charged additional fees if review time exceeded specified levels. Fee schedules are adopted by governing boards and updated periodically as programs and costs change.

The State of California also supports local air districts. California has a statutory program through which the state annually appropriates funds, known as "subvention grants," to all local and regional air agencies. The California Air Resources Board (ARB) administers the program using statutory guidelines. Funding is provided on a per capita basis, except that low population rural counties are given minimum levels of funding depending on the overall amount of money appropriated. There are few conditions attached to the money, other than that it be matched by local funds and used for air quality programs. Subvention funds are very important to smaller rural districts, but are not a major revenue source for larger air programs with problems similar to those facing Clark County. Annual subvention appropriations have traditionally been in the $6-8 million dollar range statewide.

EPA provides annual Section 105 program grants to eight California air districts, emphasizing those whose emissions are responsible for federal nonattainment problems. California does not do particularly well in the national allocation of 105 funds, so grants tend to be a welcome but modest contributor to the budgets of most grantee agencies. The total EPA program grants to California districts in FY-2000 was approximately $ 10,856,000. Grants included $7,203,000

as base grants, $200,000 to the California Air Pollution Control Officers Association (CAPCOA), and $3,453,000 for the Photochemical Assessment Monitoring Stations (PAMS) program. Table 4-2 compares the FY-2000 Section 105 funding of California districts with the Clark County Health District grant. Special attention should be given to the per capita column, which indicates how many local residents each dollar of Section 105 funding "supports." It can be seen that the closest county in population size to Clark, Sacramento County, receives nearly twice the per capita funding as Clark County and San Diego County, which has twice the population of Clark, gets an equivalent amount of funding per capita. With the exception of the Monterey Bay District, which is unique as it is in full attainment for all the current National Ambient Air Quality Standards (NAAQS), the smaller counties (Ventura, and Santa Barbara) get considerably more per capita funds compared to the two very large districts, [Bay Area and South Coast Air Quality Management Districts (AQMD)].

Table 4-2. Comparison of air pollution control agencies in California with Clark County (FY-2000 funds and population estimates, employees based on latest available data).

Agency	Total Federal Section 105 Funds	No. Employees	Population	Per capita Federal funds (Persons/$ Section 105)
Clark County	$632,965	67	1,383,335	2.2
Bay Area AQMD	$1,316,976	310	6,750,000	5.1
San Joaquin Valley	$1,639,872	210	3,268,000	2.0
Monterey Bay APCD	$247,050	38	704,100	2.8
Sacramento MAQMD	$994,969	78	1,209,400	1.2
San Diego APCD	$1,230,863	150+	2,911,500	2.4
Santa Barbara APCD	$751,293	62	414,200	0.6
South Coast AQMD	$3,675,277	761	15,620,000	4.2
Ventura APCD	$1,002,811	60+	756,500	0.8

The air districts with the most complete and effective programs also rely on other revenue sources to supplement those discussed above. The South Coast AQMD in particular has made use of emission fees. Facilities with permitted equipment are required to submit annual emission reports and to pay fees based on the quantity of criteria and toxic emissions they produce. There are major penalties for serious under reporting of emissions. The state has also made use of emission fees to fund multi-year programs such as its "Toxic Hot Spots" reporting program, an acid deposition research program, and others. These emission fees tend to be charged to affected facilities, to be collected by local air districts, to be closely tied to program costs, and to come up for regular review by the Legislature.

While all permit applications are required to be processed within specified maximum timeframes, the South Coast AQMD has recently allowed facilities that need expedited processing of permit applications to pay an extra fee to cover staff overtime. The South Coast AQMD also charges fees for certain public notices, for certifying clean solvents, reviewing environmental impact analyses, and conducting or reviewing health risk assessments.

California air districts also can collect special vehicle registration fee surcharges. These funds are earmarked for projects and programs that reduce vehicle emissions and for related

planning, monitoring, enforcement and technical studies. They are not used for stationary source-related program activities. Districts can choose, by vote of their governing boards, to charge up to $4 per registered vehicle.

The Bay Area AQMD has the unique authority under state law to receive revenues from property taxes in the nine-county area it serves.

Enforcement fines and penalties are not an important source of operating revenue to California air districts. To avoid charges of "bounty hunting," fine and penalty revenues are frequently passed through to a county budget or reviewed by the air district's governing board before they are used for program purposes. Fines collected at the state level are usually deposited in one of several designated accounts for allocation through the state budget process.

On some occasions, enforcement cases have resulted in non-traditional settlements in which facilities agree, in lieu of monetary penalties, to conduct or fund activities that supplement local air programs. They may establish and operate air-monitoring stations, conduct compliance training, retire emission reduction credits, or perform special studies to provide data and information to the air agency and the public.

OTHER U.S. AIR AGENCIES

Many air agencies across the country use funding sources that are similar to those used by California agencies. Some other sources that were identified during the conduct of this study are listed below. (Agencies receiving a part of their funding from the listed source are in italics.)

- A per capita fee or similar support collected from the revenues of cities and counties within the jurisdiction of the air district. *The Puget Sound Clean Air Agency*
- Earmarked funding from the state General Fund. *Denver Regional Air Quality Council, Puget Sound*
- Revenues from contracting to provide services to other units of government e.g.; operating an air monitoring station for the state air agency or inspecting sources that are state permitted. *Dayton Regional Air Pollution Agency*
- Federal Section 103 grants ("Research, Investigation, Training and Other Activities")
- Funds from motor vehicle-related fees such as vehicle registration, "vanity" license plates, safety and emissions inspections, including vehicle I/M programs, etc. *Puget Sound*

During our interviews, several effective agencies made a point about "generating" revenue by discontinuing unneeded or ineffective program expenditures and switching the funds to higher priority activities. A specific example was Puget Sound's decision to sharply reduce air monitoring for pollutants that never approach significant levels. Other means of conserving revenue was competitively outsourcing activities that could be performed more cost-effectively by another agency or a private sector contractor. The Ventura County APCD has cut its costs

dramatically with this device. It was also noted that sometimes it is more cost-effective to perform activities in-house that have historically been done elsewhere. Legal, purchasing and computer system management services were cited as specific examples. Finally, there are savings involved when several agencies are combined or consolidated. California has reduced the number of local air districts from more than 50 in the 1970's to 35 today. Duplicative management, legal, and administrative support functions were eliminated and the resources reallocated.

In the team's experience, there are many local and state air programs across the country that have funding problems that limit their effectiveness. In many cases there is a reluctance to charge facilities fees that are adequate to cover the real cost of air permitting and related regulatory activities. In other cases, there is such heavy reliance on federal 105 funding that EPA's program goals and priorities dominate local board and management policies. Often, under-funded agencies have to compete for special purpose funding sources that come with many conditions and are of short term duration.

NON-AIR AGENCY FUNDING SOURCES

There are a large number of creative funding sources that provide funds for research, demonstration projects and infrastructure support programs. As an example, the California Energy Commission has funds from such sources as an electricity fee on consumers, and fines for violations of state fuel content requirements, to support such activities as encouraging electric vehicles, promoting infrastructure for alternative vehicle fuels, and energy conservation. These programs are useful and have long-term air quality benefits, but they do not usually do much to support the day-to-day needs of air pollution control agencies.

Likewise, there are other non-agency funding sources for transportation such as the use of tolls or special fees for single occupancy vehicles to drive in dedicated bus/carpool lanes.

SALARY COMPARISON

One of the team's findings is that the salary structure of the Health Department is lower than that of Comprehensive Planning, except at senior levels. This raises the issue of whether the Health Department salary structure needs to be adjusted for reasons other than equity. The issue of an appropriate salary structure is both difficult and sensitive. Many local factors are important, including prevailing wages in the area, competition for certain skill packages and equity with other government employees. While it is beyond the scope of this study to make a specific salary recommendation, ENVIRON thought it would be informative to compare Clark County salaries with a similar agency. ENVIRON obtained information from EPA Region 9 and decided that a reasonable comparison could be made with the Sacramento Metropolitan Air Quality Management District (SMAQMD) in California.

The SMAQMD is essentially a one-county agency that has evolved from the Sacramento County Health Department. The agency has a similar sized staff to the total Clark County air program. The Sacramento metropolitan area has a similar population to Las Vegas, is also growing rapidly, and is facing air quality problems that are primarily caused by mobile

sources rather than smokestack industry. The cost of living and prevailing wage structures in Sacramento are considerably lower than the well known extremes found in the Los Angeles and San Francisco Bay Area regions, and therefore, are more comparable to Las Vegas.

Table 4-3, developed from information supplied by EPA, compares actual salaries of the Health Department and SMAQMD in 1999. It shows that Sacramento salaries tend to be higher for most job categories where direct comparisons are possible. It also shows that mean salary compensation for the two agencies is considerably different. Sacramento is about 20% higher overall, but this result must be viewed with care since there are a number of job categories included in the Sacramento side of the table that are not present at the Clark County health Department.

This comparison tends to confirm the comments by various interviewees that some salaries are quite low at the Air Quality Division of the CCHD and future funding recommendations need to consider correcting this deficiency to maintain competitive staff expertise in Clark County.

Table 4-3. Salary comparisons between the Clark County and Sacramento County Air Pollution programs.

Sacramento Metropolitan Area AQMD vs Clark County Health Department
A Rough Comparison of Salaries by Job Category
(Salaries in thousands of dollars)

Job Category (a)	SMAQMD	Clark County	Difference (b)
Director/ Exec. Officer	98.3	108.4	-10.1
Assistant Director		66.6	
Division Manager	75.2		
Prog Supervisor/Air Pollution Control Manager	66	54	12
Program Coordinator/Supervisor	61.4	54.8	6.6
AQ Instrument Technician/Monitoring Technician	46.7	51.4	-4.7
AQ Eng'r & Specialists	51-53.6	41.2-41.8	9.8-11.8
Administrative Assistant	45		
Secretary	33	39.5	-6.5
District Counsel	94		
Deputy District Counsel	51		
Analyst/Programmer	55		
Senior Communications Specialist	60.1		
Person Years	77.6	59.5	18.1
Salary Cost	4,138.9	2,640.3	1,498.6
Mean Salary per Employee	53.3	44.4	9.0

(a) The job categories of the two agencies do not match in many cases. Used category function within respective agencies to facilitate comparison.

(b) SMAQMD minus Clark County in thousands of dollars

SUMMARY OF FINDINGS ON FUNDING SOURCES FROM INTERVIEWS CONDUCTED IN NEVADA

INTRODUCTION

Potential interviewees were sent an interview guide that was used to structure the discussion during the interviews with the ENVIRON team. Team members that conducted most of the stakeholder interviews included David Calkins, Barbara Joy, and Jim Lyons. Four topics in the interview guide were directly related to funding issues, though funding naturally arose in many of the other technical and institutional topic discussions. The four topics were current funding mechanisms, public contributions, future revenue sources and willingness to pay, and cost-effectiveness of control measures. In addition to meeting with stakeholders residing in Las Vegas, the team also interviewed several state and federal agencies in Carson City and in San Francisco and some organizations representing key sectors of the business community. The responses are summarized by the interview topics, and the findings were a key part of our overall recommendations in Chapter 5.

CURRENT FUNDING MECHANISMS FOR AIR POLLUTION AND TRANSPORTATION PROGRAMS

The various responders identified current funding programs that they were aware of in Clark County. Most knowledgeable, of course, were government interviewees. Numerous interviewees reminded the team that following California's passage of Proposition 13 in the late 1970s, Nevada likewise shifted from property tax to sales tax as the major source of revenues. Accordingly, segments of the business community such as the casino and resort industry often were opposed to any increases in the sales tax as they felt they already paid their fair share. The programs are grouped by the level of government that has the implementation authority.

Discussion of the specific programs and current funding levels are contained in much detail previously in this chapter.

Federal

The two sources of federal funds for air pollution identified by the interviewees were the Clean Air Act's Section 105 air program grants and the TEA 21 CMAQ funds administered by US DOT. Interviewees from all sectors also mentioned the potential for highway funding limitations under the CAA. A government responder noted that EPA did not fund air pollution work performed by the Comprehensive Planning Department (CP) of Clark County and that the CCHD did not pass any of its EPA funds onto the CP for use in State Implementation Plan (SIP) development. A government interviewee also expressed the view that there was a need for more CMAQ funds in Clark County.

State

The Excess Reserve Account for Air Pollution was identified by several as a source of funding for air pollution research and implementation. Delays in receiving these revenues for use in pending issues was cited by several. Additionally, the smog check program administered by the DMV&PS provides the AQD of CCHD 60 cents and the Department of Comprehensive Planning 40 cents from each $1 of the smog check forms fee that is dedicated to the county in which the vehicle is tested. The DCP funds about 3 FTE with these funds. The motor vehicle registration privilege tax was identified by some government interviewers as a source of air pollution and transportation funding. Finally, transportation funding comes from the Nevada DOT.

Local

County sales tax revenues were identified by many as the prime local source of funding for air pollution and local street/highway improvements. Several government responders noted the 1 cent hotel room tax, the 5 cents per gallon special fuel tax, and resort corridor taxes as sources of income. The AQD receives funding from its permit fees and dust control permits/fines. Several business members and a government official responded that there should be no new developer fees, while responders from all three sectors countered that developer taxes should be an important source of revenue for air pollution control. Finally, a member of the public and a government responder noted that there is a program to provide assistance to low income families in getting a vehicle repaired if it fails the smog check.

NEED FOR GREATER PUBLIC CONTRIBUTION TO AIR QUALITY PROGRAM REVENUES

This topic solicited little substantial information. Typical to many areas, there was a general perception that the public overwhelmingly supported strong air pollution control programs but when it came to enacting new taxes, there was little enthusiasm. The issue of trust came up frequently, and was an indicator of the lack of confidence that many members of the community had in the current air pollution programs. Willingness to pay had mixed reactions – some government interviewees felt there was willingness, and other (public and government) felt there was not.

SUGGESTIONS FOR NEW REVENUE SOURCES AND WILLINGNESS TO PAY

Responders had a variety of ideas on where new revenue sources might be tapped, ranging from modifying the on-going, current funding sources to several unique and untested ideas. An often raised concern, particularly by the business community, was that the air pollution program needed to clearly define the problem sources and then assess the imposition of new fees proportionately. Another assumption that ENVIRON asked each interviewee to make in suggesting new revenue was that it would be needed. It could be possible that through streamlining the organization as noted in the Task 4 Report, and making some minor adjustments to current funding programs, new revenue sources will not need to be found. The

responses are generally organized by the level of government that would need to make the changes.

Federal

Several government interviewees, including one at the USEPA, believed that Clark County no longer receives its fair proportion of the national Section 105 program grant allocation. During the early 1990s, USEPA established a new formula on how to allocate these funds based on non-attainment status and correcting for current population. This greatly modified an allocation formula used since the 1970s that favored the heavy industry states of the East and Midwestern U.S. did not account for the rapid growth of the Sunbelt states. Funding to Clark County increased at that time. However, by the mid-1990s USEPA's approach became more political nationwide and the allocations were locked into existing levels. Since Clark County has continued to both grow and have more serious attainment problems, use of the previous formula would likely give it a higher annual award of funding.

The other federal funding program that directly impacts air quality strategies is the CMAQ program of USDOT. Several government responders familiar with the goals of this program felt it could be more focused on solving immediate air pollution problems in Las Vegas rather than focussing so heavily on high speed rail to Southern California. For example, in California the use of CMAQ funds has been approved for converting heavy duty diesel vehicles to alternative fuels. They also felt it often was used in Clark County for funding transportation planning studies that only slightly touched on air pollution issues.

State

Funding programs administered at the State level appeared to have considerable interest by the Clark County stakeholders that ENVIRON interviewed. Many of these revolved around motor vehicle registration. There was strong support (six governmental and several business interviewees) for adding $1-2 to the annual smog check form fee and returning that to the County for air pollution program implementation. Most felt that this is a fee that would cause little concern by the general public in comparison to more obvious tax increases. It was also believed that the excess pollution reserve fund could be streamlined for faster and less administrative paperwork to be returned to the county agencies. Some even advocated the local portion of the annual smog check fee be returned directly to the county without passing through the State DMV&PS. Similar suggested revenue from vehicle registration was a direct addition to the motor vehicle privilege tax for use in air pollution control. Four government responders identified this source of added revenue. Many government agency responders suggested more aggressive enforcement against unregistered vehicles and those that failed the smog check. Finally, several government and public responders suggested a special diesel-vehicle registration surcharge be imposed by the State, as this was a major cause of air pollution in Clark County.

Discussions with the Legislative Counsel Bureau identified another potential source of funding for air pollution programs. Rental car companies currently pay the Department of Taxation a 6% tax on the rental charge (excluding other fees) under NSR 482.313. Revenue from this source is projected to total over $9 million in FY 2001. Redirecting these funds or modifying current funding allocation could provide a potential source of revenue for supporting local air

pollution control programs. It should be noted, however, that four different bills to revise NRS 482.313 for other purposes failed to pass the 1999 Legislature.

The interviewees identified several new and untried suggestions for State-administered funding. A public member proposed that the vehicle registration fee be set on fuel economy ratings, not current valuation of the vehicle. Another suggested the use of the gas tax to fund alternative transportation programs. Finally, both government and business responders suggested establishing highway impact fees for air pollution program funding.

County/City

Several local funding sources, existing and proposed, were suggested by responders as a source of future air program funding. Removing the annual $17,500 cap on the use of enforcement fines by the CCHD was advocated by many governmental and some business interviewees. As discussed elsewhere, all fines collected by the CCHD for air pollution violations that exceed $17,500 in a calendar year must be transferred to the school system. Enforcement fines exceeded $500,000 in 1999. Supporters of this change believed that although the school system was certainly a priority for funding, there were many other more significant ways to balance any loss from the enforcement fine program. Several other ideas related to the CCHD air program included support by some government and business responders for higher stationary source permit fees, and for the use of funds now allocated for PM_{10} SIP supportive research to be shifted to the enforcement activities of the AQD.

Special business activities were targeted by some for higher fees. The resort and casino industry was identified by both public and government responders as a place to increase taxes. Government and business interviewees mentioned payment of the cost of soil stabilization of vacant lands and, in general, higher development fees by real estate developers. Finally, if all other sources of new revenue fail, then the County would be requested to provide additional revenue for the shortfall.

Public

While all of the above ideas eventually impact the general public, several specific funding increases would directly impact them. First, the suggestion of higher parking fees to discourage travel by automobiles was mentioned by a government responder. Second, use of special improvement districts to help pay for facilities to improve air quality and transportation access, such as park & ride lots or a Transportation Management Agency, was suggested by government as well.

COST-EFFECTIVENESS OF EXISTING AND SUGGESTED CONTROL MEASURES

Although not strictly an issue involving agency funding in Clark County, the study team was interested, for broader purposes in this study to assess the rate of cost-effectiveness or cost-benefits assessments in air quality planning in Clark County.

Nearly all the respondents to this question came from the business sector. Several suggested ENVIRON review the cost-effectiveness analysis done in Arizona (Maricopa Association of

Governments) on the potential control measures. The use of incentives to make regulations more cost-effective was suggested. Finally, the business community criticized the state agencies for not performing cost-effectiveness studies on alternative control measures.

ANALYSIS OF THE FINDINGS FOR FUTURE FUNDING REQUIREMENTS

In this section, ENVIRON discusses the findings from the interviews and our investigation into current funding programs to provide a basis for the recommendation that ENVIRON makes later in this chapter. ENVIRON examines the adequacy of existing funding programs to meet future needs, the limitations on existing funding, and identify review criteria to assess potential new revenue sources. The focus here, and many of the recommendations, is on the air pollution program funding rather than transportation funds.

ADEQUACY OF EXISTING FUNDING TO MEET FUTURE AIR QUALITY NEEDS

Tasks 1 and 2 of this study examined the current and future air pollution control requirements in Clark County. Unfortunately, the limited monitoring data on eight-hour ambient ozone concentrations, and lack of "carrying capacity" modeling studies, made it difficult to project when, and if, additional control programs would be necessary in Clark County for meeting and maintaining the 8-hour NAAQS for ozone. For PM_{10}, of course, there is certainly a focus on fugitive dust and the study recommends a prioritized list of needed control measures. It would be premature to speculate on the level of additional funding needed by the Clark County air program at this point to meet any specific requirements.

All that said, the interviews with stakeholders have identified significant deficiencies in the present programs and correcting these will require enhanced funding and staffing. The recommendations made at the end of this chapter reflect some of those needs.

In summary, there appear to be sufficient funding programs and mechanisms to generate additional funds to support a more extensive and aggressive air program in Clark County. However, before requesting any increased funding the relevant Boards must make the case that the added funding is necessary and equitable upon those sources that cause the air pollution problem.

LIMITATIONS ON EXISTING FUNDING PROGRAMS

The team evaluated the current revenue sources to see if there were any limitations for continuing funds. At the federal level, the major potential limit would be the imposition of funding limitations under the sanctions clause of the CAA. However, the current efforts to correct the air pollution program in Clark County by developing and getting approved SIPs for CO and PM_{10} would likely keep the imposition period to a minimum. Also, state and federal transportation officials believe that highway funds could be moved to other, non-sanctionable categories or to other areas of the state during the initial period of sanctions imposition.

Interviews with EPA officials, and review of past five years of Section 105 program grants to Clark County do not provide any encouragement that future levels will be greatly increased. Since 1996, there has been only a 3% increase in annual funding (see Table 4-1). Indications are that the Congress will not likely be adding major increases to EPA's overall budget in the near future. Also, the success that EPA has had in improving the nation's air over the past 30 years does not demonstrate an urgent need for greatly increased spending for air programs. An exception to this pessimistic no-growth prediction would be if the EPA once again adjusted its funding allocation formula for Section 105 grants to recognize changing population and pollution conditions. There are some signs, however, that broader based media programs such as the CBEP program and other "smart growth" programs may grow in the next few years. Areas with rapid growth, such as Las Vegas, may well be the beneficiary of such program funding.

The Air Pollution Control Account, created in the State General Fund through NRS 445B.830, directed the DMV&PS to operate a grant program that allocated 1/5 of the money received from the issuance of emission test certificates (form fees) to air pollution programs in non-attainment or maintenance areas for CO. All funds in excess of $500,000 from the remaining 4/5 of the smog fee were placed in an "Excess Reserve Fund" that could be used by three agencies – DCNR, CCHD, and the Washoe County District Health Department (WCDHD). The smog certificate fee was originally $6 per inspection, but was reduced in 1997 to $5 per inspection under AB 641 (Chapter 619, Statutes of Nevada 1997). In 1999, SB 511 (Chapter 532, Statutes of Nevada) amended NRS 445B.830 to add several other agencies that would become eligible during the 1999-2000 biennium for monies from the Air Pollution Control Account. These included the Department of Agriculture, the Tahoe Regional Planning Agency (TRPA), the Nevada Tahoe Regional Planning Agency, and other state programs that had a role in implementing TRPA's environmental standards. However, this authorization for the additional agencies in the Lake Tahoe Basin sunsets on July 1, 2001. The one exception is that TRPA activities related to air pollution remain eligible. The net effect of these amendments has been to enable the Legislature to direct a total of approximately $1.5 million in FY 2000 and 2001 to TRPA and the Nevada Divisions of Forestry and State Parks.

With the apparent frequency of amending and adjusting NSR 445B.830 over the past several years, it would appear that a potential of reconsidering and raising the fee once again to offset growing needs in I/M areas is feasible. Discussions with the DMV&PS indicated that, when the Legislature (in effect) reduced the Excess Reserve Account in 1997, it had not anticipated that the then-growing reserve would be later allocated to the Tahoe Regional Planning Agency rather than the county air pollution programs. Our interviews with state officials indicated interest in correcting the oversight.

Local funding mechanisms for air pollution control are likewise broad. The county sales tax continues to be a major revenue source and the high growth in the area should continue to provide a growing stream of revenue from this source. Increasing the sales tax rate would be met with opposition from the business community, especially the resort and casino industry. Removing the cap on use of enforcement fees and fines would greatly increase the revenue available to the AQD of CCHD, likely providing an immediate $1 million per year. Strengthening the aggressiveness of the AQD enforcement program could bring even greater revenues in the future. Continued development and enactment of extensive dust controls for

PM_{10} could give justification for higher permit fees to support an expanded enforcement effort by the air program.

REVIEW CRITERIA TO ASSESS POTENTIAL NEW REVENUE SOURCES

In the previous section, ENVIRON summarized the many suggestions of the interviewed stakeholders on specific sources of revenue to pursue in the future should the need for additional air program resources materialize. The following discussion outlines a suggested method to analyze the variety of revenue sources for their suitability to be adopted in the future in Clark County.

Before establishing a new revenue source-funding program, an agency should evaluate the following factors:

- Equity: Fairness of distributing funding burden among individuals. Is the funding burden born by those who benefit from the program activity or by those who contribute to the problem (polluter-pays)? This was a very important concern among the stakeholders interviewed.

- Legislative acceptability: How attractive is the proposed financing mechanism to the legislative body that must authorize the program?

- Public acceptability: What is the willingness of those subject to a fee or tax to pay, or the willingness of the public to make a particular sector pay? There were differing opinions in the interviews on how willing the public was to pay for additional air pollution control programs.

- Flexibility: What is the ability to use revenues from alternative financing mechanisms?

- Revenue potential: What is the potential revenue that can be raised by the financing mechanism and is it one-time or a continuing source of revenues? As noted in the characteristics of effective air programs, agencies should strive to focus on continuing revenue sources.

- Feasibility: Is the legal authority adequate to impose a fee or tax? Doing one's homework on adequate legal authority is crucial in today's litigation-prone society.

- Administrative requirements: What effort is needed to implement an alternative financing mechanism, including start-up costs and on-going collection and management of funds?

- Impacts: Does it create incentives for desirable (or possibly undesirable) behavior, and does it place undue financial burden on taxpayers or industry?

- Stability: Is this a stable, consistent from year to year source of funding? Avoid over-dependence on funding sources that are short term, dedicated to specific goals, and/or contain conditions that are not consistent with agency policies.

Table 4-4 summarizes the pros and cons of various revenue sources. ENVIRON recommends that agencies use this as guidance in assessing the potential new sources of revenue in Clark County. The various advantages and disadvantages for each type of revenue source could and should, of course, be greatly expanded for the evaluation of a particular revenue proposal.

Table 4-4. Pros and cons of pursuing new revenue sources and institutional approaches to financing air pollution control programs.

Revenue Source	Advantages	Disadvantages
Fees (A charge for a particular service or activity)	• Most equitable match of program costs with users • Can generate large revenues at low rates in large base	• Current fees are comfortably low and public may not readily accept higher fees • May compete with existing fee programs • If too high, incentive to avoid
Taxes (A charge against sales or property)	• Polluter or beneficiary pays • If broad tax base, even low taxes generate large revenues • Imposition and collection is straightforward • Consumers, rather than producers, can be targeted	• Public & legislative opposition to raise tax for new programs • Competition by government agencies for the revenues • If taxes are regressive, they impose greater costs on poor
Fines & Penalties (Imposed primarily for violation of requirements or regulations)	• Adhere closely to "polluter pays" principle • Enjoy public and legislative acceptance • Create incentives for desired behavior • Government can exercise considerable discretion	• Depends on enforcement agency's ability to detect violations • Revenues often sporadic • Sole reliance may cause regulating agency to pursue unnecessary enforcement actions
Revolving Loan Funds (Provide loans to local govt. for capital investment).	• Self-sufficient source of capital for investments • Flexible to offer subsidies where needed	• Sizeable investment of capital to create • States may not have sufficient demand for such an institution
Public-Private Partnerships	• Cost savings in construction and operating facilities	• Statutory changes may delay implementation

RECOMMENDATIONS FOR FUNDING AIR PROGRAMS

Introduction

As noted several times earlier in this chapter, programs to fund air pollution implementation and related transportation planning activities appear to be quite extensive in Clark County. Furthermore, it is still too early to determine if future control needs will greatly increase the need for new agency funding mechanisms. What is clear, however, is that there is a need to have funds identified to correct the current deficiencies in the programs and return the air program of Clark County to an effective level as discussed in detail in the Task 4 Report. Significant increases in funding over current available levels will be needed to correct all of the compensation, training, support and resource issues identified in this report. In the interviews with the CCHD, management identified a need of about $3-4 million in additional funding to pay and house the approximately 30 new positions that they will be requesting to correct current under-staffing and facility problems. The staff expansion that has been occurring in recent years at the AQD will need to continue to carry out existing programs more effectively, implement tighter new fugitive dust controls, improve enforcement, and keep up with continued growth in such activities as permitting. ENVIRON believes that this is generally true, but also feels that certain economies will be realized provided that the two existing air pollution agencies are merged. The three recommendations outlined below would bring approximately $3,521,000 in new revenue to the air program and cover the increased costs of the program as noted above. Additionally, increased enforcement penalties could provide much additional funding for the environmental programs and school bus retrofitting in the county school district. While the ENVIRON recommendation in the Task 4 Report envisions a single, consolidated air agency in Clark County, the benefits of streamlining administrative activities may well be offset by increases in salaries and facilities for present staff.

Initially, the new agency would rely on the existing revenue sources that now fund the Air Quality Division of the CCHD and the Air Quality Team of the Department of Comprehensive Planning. ENVIRION suggests that the current county contribution should be phased out over several years and gradually replaced by other sources of funding that are more directly under the control of the new agency's governing board.

The first three of the following recommendations are considered important in shoring up the current funding mechanisms to provide the immediate funding needs of the county. Recommendation 4 lists several additional funding programs that should be given further evaluation and prepared for should the need arise. While funding seems quite extensive at present, economic downturns and changed federal and state priorities could cause a need for these additional revenue sources to maintain progress toward clean, healthy air in Clark County.

Recommendation 1:

Introduction

A frequently mentioned area to examine for new revenues is the current AQD permits fee structure as outlined under Section 18 of the CCHD Air Pollution Control Regulations. While

the dust permit program has been recently upgraded and now charges $87 (1997 terms – adjusted annually for CPI – see Section 18.3.2) per acre of vacant land graded or otherwise disturbed, the permit fee for stationary sources is still relatively low compared to other air pollution agencies around the country. To demonstrate the difference, ENVIRON calculated the annual permit fees for a 500 hp continuously operating stationary diesel engine. For the current CCHD, it would pay $167 in annual permit fees. By comparison with three California local air agencies to which ENVIRON has frequently compared Clark County elsewhere in this study, the same facility would pay $880 in Sacramento County, $999 in Ventura County, and $2,955 in the South Coast AQMD. Although these comparisons cannot be directly made due to the differences in how the fees are assessed, (i.e., equipment-specific vs. emission-specific vs. combination), it is quite apparent that Clark County should consider a much higher annual stationary source permit fee.

Recommendation

The Task 4 Report recommended that a single air program for Clark County should establish permit fees comparable with those set by like-sized agencies in adjacent states. This would apply to those sources already in the county as well as for new sources.

Discussion

The compliance and enforcement program was found to be the most deficient activity of the current Clark County air program in the effective program characteristic ratings in Task 4. Increasing the permit-to-construct and permit-to-operate fees should be directed to the improvement of that program with the addition of the needed inspectors and permit writers. As noted in the Task 1 Report, there are 800 industrial facilities in Clark County that receive annual operating permits and another 200 that receive periodic Various Location Permits (VLP). Enforcement of stationary source regulations and permit conditions for these 1,000 facilities is currently handled by a single inspector. Total permit fees in 1999 from these sources were approximately $800,000. Doubling the annual permit fees would bring a minimum of $800,000 additional revenues.

Comparing this revenue source of higher permit fees against the pros and cons of Table 4-4 yields the following findings. First, it is an equitable match of program costs with the users (permitted sources). Second, by affecting a large number of users, the increase can be relatively small versus the anticipated revenues. The main disadvantage is that the sources have been used to paying quite small annual permit fees and may strongly oppose any significant increases.

Recommendation 2:

Introduction

The I/M (smog check) program is funded from inspection fee revenues. Under NRS 445B.830 4(a), the State grants 1/5 of the amount of the inspection forms fee (currently $5) to Clark County, splitting it 60/40 between the Air Quality Division of the CCHD and the Clark County Comprehensive Planning Department. These funds must be used for air pollution program purposes, and Comprehensive Planning indicated that Clark County received

$762,573 in 1999. Revenues from the $1 share are reasonably consistent from year to year and are used to fund long-term needs. A second source of revenue is the excess reserve, which consists of leftover funds that DMV does not need to run the I/M program during a given year (NRS 445B.830 4(b)). These revenues are available for special research activities on a competitive basis by the county air agencies. Since the amount of revenue available from the excess reserve varies, it tends to be used for one-time expenditures.

Recommendation

The State Legislature should revise the current statute NRS 445B.830 4(a) that sets a $5 maximum "forms fee" on each vehicle that receives a smog certificate to $7 per vehicle in Clark County, only. The $2 "surcharge" would be in addition to the 1/5, i.e., $1 currently returned to Clark County from this program. Thus, a total of $3 from the revised $7 form (smog certificate) will be returned directly to Clark County for use in implementing the air pollution control program. The Excess Reserve program will continue to distribute funds that are not required by the DMV to implement the smog check program. Additionally, it is strongly recommended that an aggressive enforcement program for identifying and prosecuting unregistered vehicles be implemented in Clark County under the auspices of the Nevada Highway Patrol and local enforcement officers.

Discussion

The discussion with interviewees indicated that this particular recommendation would likely be the most acceptable direct method of providing additional revenue for air pollution control programs in Clark County. The actual increase is only $1 over the forms (smog check certificate) fee that existed prior to the passage of Assembly Bill 641 in 1997. Providing the funds directly to the County for distribution to the air pollution program will save additional administrative costs as well as expediency. The expected revenues from this proposal, based on the projected testing of 912,734 vehicles in 2002, would be approximately $1,825,000. Interviewees from government agencies indicated that from 1/4 to 1/3 of the total vehicles that are used in Clark County are unregistered. If one applies the conservative assumptions of 25% non-compliance on vehicle registration, and the recommended aggressive enforcement program reduces this to 5% non-compliance in 2002, total revenues would rise to $2,300,000. Thus, active enforcement of registration of all vehicles would bring an additional $475,000 from the $2 added fee and another $237,500 from the current $1 that is returned to Clark County. In summary, the increased revenue from full implementation of Recommendation 2 is approximately $2,538,000.

Reviewing this recommendation against the advantages and disadvantages for fee-based revenues in Table 4-4 yields the following results. The major advantage is that it can generate large revenues at a relatively low increase per person. It is also very equitable as it matches costs with the users of motor vehicles, a significant source of the Clark County air pollution problem. The Legislature should give serious consideration, from the equity perspective, to applying this "surcharge" to all types of vehicles currently covered, or added in the future to the smog check program. The only perceived disadvantage when comparing to Table 4-4 is that of it may possibly compete with other efforts to increase motor vehicle registration fees such as a higher privilege tax or special annual vehicle registration surcharges.

Recommendation 3:

Introduction

Enforcement fines and penalties have become quite substantial as the county has grown in size and the air agencies are now taking a more aggressive enforcement stance, partially under pressure from the US EPA. Enforcement fines were an astonishing $9,300 for the FY 87-90 period, averaged $100-200,000 in mid 1990s, reached $300,000 in 1998, and exceeded $1,000,000 in 1999. Realistically, the 1999 level was about $541,000 due to uncollectible fees including a major violator that has ceased operation rather than pay the fine. Violation penalties for the first violation are $2,000 per day, but rise by $2,000 per offense up to $10,000. These are considered quite low in comparison to California agencies, which are typically $10,000 per day. The amount of annual penalties returned to the CCHD is limited to $17,500 to defray administrative costs of the air pollution control board (NRS 445B.500(4)). The remainder of penalties collected during the year must be given to the county schools. Although penalties are not an important source of revenue in California as these agencies have other programs such as vehicle registration surcharges and hefty emission fees, they could be an important source of revenue for the Clark county program if the annual cap were eliminated or raised. Several interviewees noted that there are many other ways that the school system can get additional funding and in much greater quantities than from the air pollution enforcement program.

Recommendation

Enforcement penalties in Clark County should be increased from the current $2,000 per day (initial violation) to a level closer to the norm in other large and growing local air pollution programs elsewhere in the country. The $17,500 cap should be eliminated or raised to a level of not less than $200,000 per year. Enforcement penalties received above $200,000 in any calendar year would be placed in a fund to improve environmental education in the schools and/or be spent to lessen exposure levels to school children of air pollution from motor vehicles (buses).

Discussion

Elimination or adjustment of the $17,500 cap was raised as a revenue source by a large number of government stakeholders during the interview process. It has only been in recent years that enforcement settlements were of a size that provided much additional funding to the school system. Rather than provide the air agency with all the enforcement fines from the recommended removal of the $17,500 cap, an approach suggested would be to target a certain portion of these new funds to environmental education programs within the schools. Additionally, some of the funds could be used to offset the cost of converting school buses from diesel to alternative fuels. The annual revenue to the air agency from the setting a $200,000 cap would be $183,000. More significantly, as the county air pollution agency aggressively enforces additional regulations, such as the dust rules for PM_{10}, the increased penalties should provide for significant assistance to environmental education and protection programs in the school district.

Increasing penalty levels for first offenses will have the impact of causing potential violators to make every effort to comply with the regulations. The value of this recommendation will, hopefully, be more in terms of reducing illegal air emissions than in providing additional revenue. No credit for additional revenue is included in our summary of the benefits of the three recommendations.

Comparing this revenue source of fines and penalties against the pros and cons of Table 4-4 yields the following findings. It adheres to the "polluter pays" principle, as the enforcement fines will go directly into air pollution control programs. Return of the fines to the air program provides incentives for aggressive, yet fair enforcement behavior as the agency can put the funds they obtain from their enforcement actions back into the air program. Finally, it would allow the air program and the schools considerable discretion on how to use the funds. The key negative would be a temptation to "bounty-hunt" and pursue unnecessary enforcement actions to bring in the additional revenue.

Recommendation 4:

Introduction

As noted earlier, ENVIRON found very limited information on future attainment needs and current emissions/carrying capacity. Therefore, the above recommendations primarily address operating a single agency air program at a much improved effectiveness level rather than necessarily the need for increasing funds for future activities. However, should new problems arise in meeting current or future air quality standards, or if the robust economy takes a downturn, Clark County should be prepared to pursue other revenue sources. Recommendation 4 identifies those areas that further research may provide candidate revenue sources.

Recommendation

During the next three years, staff at the various county agencies including the air pollution agency should pursue a careful examination of the pros, cons, cost-effectiveness, and revenue potential of the following institutional approaches to funding air pollution programs. The priority approaches are as follows:

- Encourage US EPA to re-evaluate its funding allocations to assure Clark County gets its fair share
- Assess a special surcharge at registration for diesel vehicles, based on their pollution potential
- Examine an annual motor vehicle license plate registration surcharge
- Review the CMAQ funding projects and assure that they fully implement and support SIP priorities
- Consider amendments to NRS 482.313 (rental car fee) for express purpose of funding air pollution control activities

Discussion

Revenues from these proposals were not evaluated within the limited resources available in this study. They were examined against the Table 4-4 criteria and found generally meeting that criteria.

5. GOVERNMENTAL ROLES AND RESPONSIBILITIES FOR AIR QUALITY PROGRAMS IN CLARK COUNTY, NEVADA

INTRODUCTION

The operation and organizational structure of air quality programs in Clark County is a key to the current and future effectiveness of the programs. The effectiveness of air programs is necessarily dependent upon the effectiveness of the organizational structure and operation of that structure. The organizational structure sets the context for the manner in which air program goals are formed and reached, from the makeup of the governing board or boards to the organizational structure through which communication, policies and planning flow. However, the success of the programs depends also on the effectiveness of the operation of that structure in the development, implementation, and communication of air goals, policies, and programs. This study has found significant deficiencies in both the structure and operation of Clark County air programs and recommends changes to both.

The primary recommendation is to consolidate the air pollution program into a single agency with an accountable, governing authority. A recommended organization chart and suggested make-up of the governing authority is included on page 32. The organization chart shows an Executive Director as heading the organization. Directly reporting to the Executive Director would be a general counsel; assistant director for research and technology; a public information officer; a state and federal liaison officer, and four assistant directors heading divisions of administrative support; planning; field operations, and enforcement/compliance. Such an organizational structure is consistent with efficient air pollution management programs found elsewhere in the United States. As a result of the initial recommendations made to the SB 432 Subcommittee in June 2000, representatives from Clark County and Southern Nevada cities have been working to develop a new organizational structure to deal with some of the concerns raised in the ENVIRON report. These preliminary recommendations will also be discussed in this Final Report.

This study strongly recommends a professional management consultant be employed to orchestrate the actual organizational setup as well as ancillary issues such as continuance of health insurance coverage and achieving parity in salary structures. ENVIRON also recommends that the Executive Director be selected through a national management recruiting effort.

The study team also makes several non-organizational recommendations regarding appropriate relations between Board and senior management; program funding levels; staff issues; the role of state agencies; relations with the USEPA, and public outreach/education programs.

Per the contract and scope of work, the team made efforts neither to base the organizational recommendation on a consensus nor to develop consensus. However, it is interesting to note that the most frequent comment received throughout the investigation was the need to consolidate the air pollution control effort into a single agency with an accountable, governing authority.

ORGANIZATION OF CHAPTER

This chapter includes (in the order listed):

- A description of the information sources used to assess the current institutional structure in Clark County;
- An overview of the process used to develop the recommendations;
- A summary of the interviews held with local stakeholders and managers of effective air programs in other parts of the U.S.;
- A description of the characteristics of effective local/ regional air programs;
- A quantitative ranking of Clark County with respect to effective program characteristics;
- A discussion of recommended organizational changes to address Clark County deficiencies; and
- A discussion of recommended non-organizational changes to address Clark County deficiencies.

SOURCES OF INFORMATION USED TO DEVELOP INSTITUTIONAL RECOMMENDATION

In order to develop a recommendation for an improved institutional structure, it was necessary to assess the current effectiveness by obtaining information from as wide a variety of sources as possible. These included:

- Previous studies
- Articles in the popular press
- Interviews with current stakeholders
- Interviews with managers of effective programs in other geographical areas
- Program needs identified elsewhere in the study

Previous Studies of Air Quality Programs in Clark County

Previous policy studies included past program audits by the United States Environmental Protection Agency (USEPA); findings of the Southern Nevada Strategic Planning Authority (SNSPA) Needs Assessment; the Clean Air Action Plan; USEPA's evaluation of the Clark County Health Department (CCHD) collaborative review efforts; and the draft White Paper of the Consensus Building Subcommittee. ENVIRON also reviewed relevant state statutes providing enabling authority for agencies such as the Clark County Department of Comprehensive Planning (DCP) and establishment of new agencies such as the Regional Planning Coalition (RPC); and memorandum of understanding regarding the makeup of the Air Quality Planning Committee (AQPC) consisting of the Department of Comprehensive Planning, the Clark County Health District; the Regional Transportation Commission (RTC); local cities; and state agencies. Reports and responses to various concerns raised by members of the Las Vegas community, such as the Nevada Environmental Coalition's (NEC) Report on the CCHD and that agency's response to criticisms raised during the February 14, 2000 meeting of the Senate Bill (SB) 432 Subcommittee were examined. Also reviewed for the purpose of understanding operational characteristics, were numerous technical studies and

previous air quality plans, as well as correspondence regarding these plans. A listing of all the studies received and reviewed during this study is contained in Appendix D.

Articles in the Popular Press on Clark County Air Programs

The many articles in the popular press about Clark County air programs provided a valuable source of information on the attitudes of the public, the effectiveness of responses by air quality officials, and the specific issues of highest interest to the general public. The many criticisms published also helped to form questions for the stakeholder interviews. When interviewees were asked to respond directly to criticisms in the press, the responses provided valuable information regardless of the validity of the criticism.

Interviews with Current Clark County Stakeholders

Interviews with stakeholders proved valuable in assessing the current institutional framework and effectiveness. A large number of committed, concerned, experienced and knowledgeable individuals contributed significant amounts of time to preparing for and participating in the interviews, many of which took up to three hours. Thirty nine interviews were held with Clark County stakeholders and key staff. This included 30 personal interviews with stakeholders, consisting of 17 government officials, 10 members of the business community, and three public members. Seven one-on-one personal interviews were held with key technical staff at the CCHD. Finally, two telephone interviews were conducted with key members of the business community who could not be interviewed in person. The objective was to obtain information and opinions from as wide and representative a cross-section of Clark County stakeholders as possible. Interviews were held with personnel and managers of the Department of Comprehensive Planning, the Air Quality Division of the Clark County Health District (AQD); the Regional Transportation Commission; the Clark County Department of Aviation, the Nevada Department of Environmental Protection (NDEP); the Nevada Department of Transportation (NDOT); the Nevada Department of Motor Vehicles and Public Safety (DMV&PS); representatives from the cities of Las Vegas, North Las Vegas and Henderson; a representative of the Board of County Commissioners; a representative of the AQD's Hearing Board; representatives of business interests and groups such as the contractors' association; the homebuilders' association; the Western States Petroleum Association; the Automotive Manufacturers Association; and several members of the public. The ENVIRON team also met with federal representatives of the USEPA and the United States Department of Transportation (DOT). At each interview ENVIRON requested that the interviewee provide any additional names or organizations whose opinions they believed would be important to reflect in this report. A complete list of all persons interviewed is contained in Appendix A.

Each of the initially-identified interviewees was mailed a letter from Senator Jon Porter requesting support and participation, which was accompanied by a lengthy series of questions developed by the ENVIRON team. The questionnaire and interviews focused on technical, institutional, and financial issues, as well as general attitudes and perceptions regarding air quality. For example, technical questions included issues such as the adequacy of current procedures for assessing air quality (air monitoring, emission inventories, tracking programs, underlying assumptions regarding population or transportation activity) or current control measures and programs for stationary, area, and mobile sources, and their effectiveness. Institutional questions focused on whether there were needed changes to the institutional

structure that would improve air quality programs, or the need for increasing the role of the State agencies or Legislature in Clark County air programs. Financial questions addressed current funding mechanisms for air pollution and transportation programs, needs for greater (or lesser) public contribution to air quality program revenues and similar issues. Each interview focused on those questions the interviewee was most familiar with. For most of the interviews, two or more ENVIRON team members were present. A copy of the letter from Senator Porter and the interview guide is available in Appendix B.

The team was not able to conduct interviews with every individual suggested, due to scheduling conflicts and resource constraints. In addition, interviews with the public were limited to those members of the public who had expressed significant interest in air quality issues. These individuals were involved because they had complaints about air programs and their perspectives reflected this. The only other measure of public awareness was through questions to staff of the Health District and Comprehensive Planning regarding the number and type of phone calls fielded from the public. The nature of the questions was revealing and these public calls were generally to complain.

Several of the individuals providing testimony at the February 14, 2000 SB432 hearings were interviewed. As the concerns of these individuals were almost exclusively focused on Health District issues, some staff of the AQD were concerned that attention to a vocal minority without also interviewing other staff would result in a biased perspective. This concern was complicated by a wide impression that the SB432 study was limited to an effort to investigate the Health District. In response, an informal interview was held with approximately 15 AQD staff, followed by a scheduled meeting open to all staff. In addition, seven one-on-one interviews with Health District staff members were held to obtain specific technical information. In all, approximately 30 current staff members, two previous staff members, and three senior managers of the CCHD were interviewed.

Interviews with Managers of Effective Air Programs

With the assistance of the director of State and Territorial Air Pollution Program Administrators and the Association of Local Air Pollution Control Officials (STAPPA/ALAPCO), the team also identified a small number of highly successful air programs, gathered basic information on their organizational structure, and interviewed senior managers. The purpose was to help define specific characteristics of successful air programs and to determine whether any might be transferable to the Clark County situation. Agencies were selected primarily for their reputation for overall effectiveness. Other considerations included the degree of similarity of the air quality problems to those in Clark County and whether the programs served large and growing urban areas. Numerous agencies were identified and of those, 5 were selected for data collection and telephone interviews. Interviews were completed with 4 of the 5 selected agencies; one was eventually dropped because of the unavailability of senior management. The 4 agencies included:

- The Puget Sound Clean Air Agency (Seattle)
- The Ventura County Air Pollution Control District (Southern California)
- The Regional Air Quality Council (Denver)

- The Regional Air Pollution Control Agency (Dayton, Ohio)

The process provided valuable input to the development of a list of characteristics of effective air programs. The team also found in this process that some agencies with what appeared on paper to be ineffective organizational structure were still quite successful due to the high quality of the managers and overall support of air programs by elected officials and the public.

Program Needs Identified in Tasks 1 and 2

Clark County has had a pattern of problems in developing air plans by the regulatory deadlines and developing approvable (for example all three PM_{10} plans have been disapproved) State Implementation Plans (SIPs) on time. There has been persistent uncertainty regarding the accuracy of the emission inventories and a continuing inability to explain how it can be that air quality appears to be getting worse when official public statements are that it is improving. The results reported in Chapters 3 and 4 showed a number of technical and programmatic needs for improved emission factors and inventories, planning and enforcement practices, control measures, and air plan. Many of the needs seemed to go unfilled due to institutional and structural considerations rather than the quality of the personnel.

Although there has been improvement in air quality relative to carbon monoxide, growth and a pattern of inattention to stationary and area sources has led to apparently chronic particulate matter and evolving ozone problems. While stationary and area sources (i.e., non-vehicular) contribute very little to ambient CO concentrations, they do contribute significantly to particulate matter and, to a lesser degree, to ambient ozone concentrations.

ENVIRON Team Experience and Expertise

Members of the ENVIRON team have experience with highly effective, somewhat effective, and ineffective air quality programs. As managers at the USEPA and the California Air Resources Board, four team members in particular have had years of direct involvement in institutional and organizational issues. Together with the other factors, this experience played a significant role in developing the recommendations outlined here. Experience working with efficient and inefficient organizations contributed greatly to the confidence with which the team reached their unanimous conclusions.

PROCESS FOR DEVELOPING RECOMMENDATIONS

The process for developing the recommendations was as follows:

- Use the interview process to determine whether the current organizational structure was perceived to be working effectively or not, and characteristics of effective air pollution organizations. Also use the interview process to solicit suggestions for an optimum organizational structure;
- Develop a detailed list of features representative of a successful air program;
- Have four key ENVIRON team members quantitatively rank Clark County air programs with respect to each of the features representative of a successful program;

- Use the results of the ranking to determine whether to recommend maintaining the current structure or creating a different structure; and
- Recommend a structure that the team members have consensual agreement on its effectiveness for Clark County.

After completing the review of studies and the interviews, the team met several times to discuss the findings and possible recommendations for the institutional structure in Clark County to handle air pollution control in the future. Table 5-1 describes the pros and cons of the options discussed.

Table 5-1. Pros and Cons of Organizational Options Considered by ENVIRON.

Recommendation	Pros	Cons
Conclude that existing structure is appropriate and efficient	Less work, confusion, maximum retainment of current staff.	Doesn't address observed institutional problems.
The operations of one agency with responsibility for air quality be combined with another existing agency with air responsibilities (for example "roll" the AQD into Comprehensive Planning or vice versa)	Leaves some of current structure intact, provides for familiarity by public.	Institutional problems exist at both air agencies, and combining them into one may further entrench some of the problems.
Regional super-planning agency with roles for land use, transportation planning, water quality and air quality	True regional planning approach that considers interactions between land use, air, water and transportation.	Cumbersome and no national example of this approach. Difficult to ensure true coordination. May be too soon, too much for the situation in Clark County.
Create a single air agency, including a greater role by the State air and transportation agencies, from the existing air programs.	Addresses needs for change, streamlines the current responsibilities, integrates all air pollution programs into one place.	Difficult to knit together two programs; Las Vegas has had little prior success with large, single agency structures.
Use interagency agreements, Memorandums of Understanding (MOUs), and annual high-level meetings of principal stakeholders to assure that the air pollution program continue effective progress toward achieving the standards	Uses existing structure but enhances through required coordination. Minimal change that attempts to address some of the major deficiencies.	Doesn't address institutional problems within existing air programs. No basis for believing that additional coordination will work given that existing coordination is not working.

SUMMARY OF FINDINGS ON INSTITUTIONAL AND PROGRAMMATIC ISSUES FROM THE INTERVIEWS CONDUCTED BY THE ENVIRON TEAM

As noted in the introduction, a key part of the ENVIRON team analysis of the roles and responsibilities of government in controlling and reducing air pollution in the Las Vegas Valley consisted of nearly 40 interviews of key stakeholders and agency staff. In addition to the interviews related to the Las Vegas air program, the team interviewed four other local and regional air agencies from elsewhere in the country. These were selected with the advice of the Executive Director of the Association of Local Air Pollution Control Officials (ALAPCO), Mr. William Becker. The purpose of these interviews was to provide a comparison of our findings on the Clark County air program with effective, nationally recognized air programs. The results of these two separate interview programs are described below.

RESULTS OF INTERVIEWS CONDUCTED WITH CLARK COUNTY STAKEHOLDERS

Introduction

Potential interviewees were sent an interview guide that was used to structure the discussion during the interviews with the ENVIRON team. Team members that conducted stakeholder interviews included David Calkins, Barbara Joy, and Jim Lyons. Additionally, a team under Earl Withycombe conducted interviews with technical staff of the AQD. Approximately twelve of the interview topics related to institutional issues, roles of the state agencies and the legislature, and the public perception of air pollution and growth in the Las Vegas area. In addition to meeting with stakeholders residing in Las Vegas, the team also interviewed several state and federal agencies in Carson City and in San Francisco and some organizations representing key sectors of the business community. The responses are summarized here by interview topics, and the findings were a key part of our overall recommendations in Task 4.

Changes to the Institutional Structure for Improving Air Quality Programs in Clark County

The discussion of how well the present air program succeeds in addressing the serious air quality issues in the Las Vegas Valley evoked considerable discussion from nearly every interviewee. Concerns over organization, coordination, public participation, and relationships with USEPA and other state/federal agencies were extensive. The majority of those interviewed felt it would be necessary to create a single agency to address air pollution. Supporters of this approach included government agencies such as the RTC and the cities of Las Vegas, North Las Vegas, and Henderson. Business representatives such as the homebuilders, construction contractors, petroleum suppliers, motor vehicle lobby groups, the Chamber of Commerce, and key consultants all believed it was necessary to create a new agency for all the air pollution activities in Clark County. The majority of the public representatives also supports a single agency, and often recommended that a major change of current managers be enacted and that the agency's Board include State and perhaps even Federal representation. The state agencies were generally more neutral on recommending such an agency, but both the Federal Highway Administration (FHWA) and the USEPA supported combining the current activities on air pollution control into one agency. Variations on a

single agency including some support for eventually creating a true environmental agency, and even some support for adding land use to this agency. The cities generally felt they had little "say" in current air pollution planning as the County tended to dominate the meetings. On the other hand, observations by members of the ENVIRON Team at several of these planning meetings concluded that representatives of the cities tended to be mid-level rather than the more senior, management level attendees from the countywide agencies. Most interviewees, however, preferred to limit the powers for the present to strictly air quality with strong coordination with transportation agencies.

A smaller group of interviewees felt that it was not yet timely to create a new, single agency for air pollution in Clark County. These include several county agency officials (airports, comprehensive planning, health department) and NDOT. The most common reason given for keeping air programs in the CCHD and Comprehensive Planning separate was the concept of checks and balance. Another reason given was a concern that any attempt by the State to force local agencies with air pollution authority to give up existing power would be met with strong opposition.

Several alternative forms of organization were suggested. Staff of Comprehensive Planning suggested looking at Denver's Regional Air Quality Council (which was one of the four "effective local agencies" examined by the team); NDOT suggested looking at how Washoe County was organized to deal with air pollution; the Nevada Contractors Association felt that the current RTC was a good model of organization and management; several business organizations and one government official suggested further examination of the recent Southern Nevada Strategic Planning Authority; and many interviewees identified the Southern Nevada Water Authority as the most successfully organized and managed agency in the Region. The creation of an air pollution authority structured like those in many California areas frequently was raised by the interviewees. While several public members and a business representative supported such an organization, many other members of the business community were vehemently against such an approach. The team in developing its recommendations examined all of these organizations in some detail.

As a significant concern, many interviewees cited coordination among the existing air quality and transportation agencies having roles in air pollution plan development. Five governmental, two public, and four business representatives specifically raised agency coordination issues. Many interviewees, particularly from government, strongly advocated that the County or State conduct a semi-annual summit of all the key decision-makers to review progress toward achieving cleaner air and identify institutional problems that may be hindering the process.

Many organizational problems were also raised in the interviews. The use of an outside Legal Counsel for the Air Quality Division of the CCHD was a serious concern to many interviewees. The CCHD vigorously defended the position and knowledge of the Legal Counsel, while other government agencies believed the "appearance of conflict" of the incumbent more damaging than any actual decisions made by the incumbent. However, several interviewees from other government agencies, the business community, and certainly the public, strongly opposed the Division using an outside Legal Counsel. Recommendations usually consisted of creating a staff of professional lawyers as legal staff to the CCHD.

The need for a stronger Public Information Office was raised by many, especially in the business community. The feeling was that the AQD was too reactive and needed to become much more proactive in its approach to air pollution issues. Improved public education and outreach was encouraged by many.

Finally, relationships with the USEPA were raised both here and in other areas of the interviews. Several government agencies indicated having problems in relating to the USEPA, while at least one member each from government, public, and business believed that USEPA needed to get more involved in Clark County air issues.

Increasing the Role of State Agencies or the Legislature in the Clark County Air Program

With the many concerns that have been raised over the effectiveness of the current air program for Clark County, an important area to explore is that of increasing the involvement of the relevant State agencies in the oversight of the program. The interviewees were asked to provide their opinions and suggestions for an appropriate role by the State. In summary, it was very apparent that most felt the State role was quite minimal at present and the overall air program would indeed benefit from a strengthening of the mandates of the State agencies.

Seven governmental agencies, two public interviewees, and several business representatives all acknowledged that the current State role in Clark County was minimal. These same representatives, along with some additional business interviewees, advocated strengthening the State role. One business representative stated that "only the Legislature can make things happen in Clark County." Three governmental agencies and two business representatives were opposed to a stronger State role.

Suggestions for strengthening the State role include several businesses suggesting the Governor issue an Executive Order outlining the management of the Clark County air pollution program. It was also suggested by government agencies in Clark County that the NDEP and DMV take a more aggressive role to strengthen the existing I/M program to the USEPA-defined "enhanced" level. One business, however, felt the State should delegate the I/M program from the DMV to the local (CCHD) program. Finally, several commenters including a State agency identified the difficulty of attracting and retaining experienced staff at current salary levels in State government.

Potential Legislative Actions to Address Current Problems or Gaps in the Air Pollution Program

Background on Recent (1999) Legislation Related to Air Quality and Regional Planning

During the 70th Session (1999) of the Nevada State Legislature, several important bills were enacted related to air quality and regional planning for Clark County. In addition to SB 432, under which this study is being conducted, five other bills revised the statutes. A brief summary follows as an introduction to a discussion of what various persons in our interviews identified as yet additional actions for legislative consideration.

SB 391, which amends Chapter 278 of Nevada Revised Statutes (NRS): Relates to land use planning by providing provisions to preserve the rural character of certain areas in Clark and

Washoe counties. It establishes a program to analyze the cost of infrastructure and enter into agreements to develop that infrastructure in these areas. SB 391 may have some relevance to the PM_{10} strategies for rural dust control.

SB 436, which amends NRS 350.002. Also related to regional planning, it is most directly related to Task 4 in that it creates the Southern Nevada Regional Planning Coalition (SNRPC). It creates a governing board, prescribing their powers and duties, and establishes a technical committee to implement. Unlike the SNSPA, the SNRPC does not sunset. The SNRPC is not a regulatory agency, though Governor Guinn has stated that no regional planning authority will be created without the approval of the SNRPC. A consulting firm is developing a comprehensive regional policy for the SNRPC. The SNRPC, through Comprehensive Planning, has applied to the USEPA for a $250,000 grant, known as a Sustainable Development Challenge Grant, to help support the coalition in its role under SB436. USEPA has offered the funding to the Department of Comprehensive Planning (coordinator for the SNRPC grant) and it should be awarded by mid-July. Related to the provisions of SB 436 is AB 493, which amends Chapter 278 of NRS. AB 493 calls for the development of a comprehensive regional plan for Washoe and Clark counties.

SB 394, which amends Chapters 278 and 445B of NRS: Provides for coordination between land use, transportation, and air quality agencies in Washoe and Clark counties. It instructs the SNRPC to develop regional policies for orderly development, standardize population projections, recommend measures to increase the efficiency of governmental agencies and services, review every two years each city and county master and capital improvements plan, and, most importantly, coordinate with the local air pollution control board and regional transportation commission. This coordination is to ensure plan consistency and integrate long-range economic, financial, and natural resource activities in the county. It will specifically examine any transportation control measures contained in the air quality plan and consider use of alternative land use designations to facilitate the plan's successful implementation.

SB 511, which amends NRS 445B.830: Relates directly to air pollution funding as it revises the provisions related to expenditures from the pollution control account (part of the state general fund). It provided $5 (1/5 the $25 I/M inspection fee) to the county as well as excess money in the pollution control account (over the $500,000 that must be maintained). Of equal significance, it opened up the Excess Reserve Fund to other agencies with the net effect of there being less money available for use by State and local air quality agencies.

The team identified through the interviews a very extensive list of potential legislative fixes to the Clark County air program. They have been grouped into three categories for prioritization, primarily based on how frequently suggested and how credible to improving the air program. No attempt is made here to rank the individual actions within the category.

Highest Priority Changes

- Adoption of California vehicle emission standards and fuel regulations
- Provide much larger proportion of AQD enforcement fines directly back to the agency. Currently, annual return on CCHD enforcement actions are limited to $17,500 even though 1999 enforcement fees totaled over $500,000. The remainder goes to schools, which have considerable other sources of funding

- Require all state and local government vehicles to burn cleaner fuels
- Establish annual I/M program for diesel vehicles, including roadside inspections
- Inspect off-road construction equipment for emissions
- Increase Highway Patrol fines for vehicles found avoiding registration or the I/M program
- Strengthen I/M program in Clark County to the EPA-enhanced I/M guidance level of stringency

Mid-priority Legislative Changes

- Create a special fund for air pollution research and implementation
- Streamline the excess reserve fund (SB511) to provide more timely distribution to the local agencies
- Provide incentives for those privately owned diesel vehicles to convert to cleaner fuel
- Tighten the rules for car dealers who perform their own "I/M"

Less Priority or Less Frequently Suggested by the Interviewees

- Dedicated state fund to support the voluntary implementation of air pollution control programs and regulations when subject not subject to the rules
- Establish time limits on how long vacant disturbed land can sit before construction

The above list does not imply that the ENVIRON team is recommending it be enacted into State law, but reflects the suggestions heard from many of the interviewees. Further examination may find that some of these recommendations can be enacted without enabling legislation. The controversial issue of setting urban growth boundaries was frequently raised in our interviews. It received support from several public and governmental interviewees, but overwhelming opposition from business and many government officials.

Staff Management Competence

Although this was not a direct question included in the interview guide, ENVIRON received numerous and often unsolicited comments on the management skills of senior managers, especially at the CCHD. Management capability was raised by responders from all categories as well as both internal staff and, of course, the whistleblowers. Some noted that some of the relevant, senior management positions at CCHD required a professional engineer to fill the position. They felt that not enough emphasis was placed on hiring experienced managers, and the engineering requirement eliminated candidates with strong management skills who did not have the Professional Registration as an Engineer. Interviews with CCHD staff seemed to reflect a failed effort at developing a true collaborative consensus process at the CCHD. This was felt by some staff responders to be indicative of poor management philosophy or lack of openness to change at the CCHD.

Technical Competence of Local and Countywide Air Pollution/Planning Agencies

The interviewees were asked to comment on their perceived view of the technical competency of agencies in Clark County that have air pollution responsibilities, i.e., CCHD, RTC, and Comprehensive Planning. Only those interviewees who frequently deal with any of the agencies were queried.

As the largest agency dealing with air pollution, the Air Quality Division of CCHD received the most comments. Interestingly, at least one interviewee from of all three sectors (government, business, and the public) gave the AQD a favorable rating, and an unfavorable rating. The most numerous unfavorable ratings came from the business sector, while the most numerous favorable ratings from the governmental interviewees. The AQD Director got very positive reviews for his technical knowledge but much less favorable support for management. It should be noted that within the AQD, staff interviews also gave both favorable and unfavorable overall ratings to the AQD's competence. All three sectors had at least one comment that the AQD staff was demoralized by the frequent negative press coverage, the working conditions at the CCHD, and lower pay scales than other County employees in the air pollution field. Both public and business interviewees noted that staff needed more training opportunities to better understand the overall program.

The Comprehensive Planning program of the County received mixed reviews, with numerous positive comments about the air quality planning manager. Some concern over staff coordination with other agencies was expressed. The Regional Transportation Commission received very good reviews by business and governmental interviewees. The new general manager got particularly high support by the business sector, and the principal planner was commended by several for his air expertise within RTC. However, another government reviewer noted that RTC had very limited expertise in air quality issues. NDOT also received favorable comments from other government interviewees. A public interviewee thought that the Desert Research Institute was very capable on technical issues.

Other general comments by interviewees include the need for better leadership skills by local agencies (government and business comments) and that individual competence was more of a problem than the organizational structure was a comment by the county manager's office. As noted elsewhere in this report, reorganization *per se* does not assure successful air quality management. Agencies consist of people with specific skills and placing such persons in the proper positions can go a long way toward a successful air quality program. Interviewees frequently noted that they were not confident that the current AQD staff organization adequately reflected this organizational quality.

Role of Air Quality Considerations in the Ongoing Transportation Programs in Clark County

Most persons interviewed felt that the recent threat of transportation funding sanctions as a result of the failed conformity finding, as well as the potential FIP by USEPA, had greatly increased the awareness in Las Vegas and Nevada of the important relationship between air quality and transportation. All sectors, government, public, and business raised concern over this issue. Four government interviewees indicated that the threat of sanctions was serious and that an approved emission budget for conformity determination was of utmost importance. Several interviewees identified the important role of the RTC in air quality conformity analysis. A need for a common data and information network for air quality and transportation planning was noted by the government sector.

Adequacy of Coordination Between Air Quality and Transportation/Land Use Agencies

The general perception is that air quality considerations in transportation programs are based on meeting conformity rules but are not proactive or based on a policy of improving air quality. Because of the influence of the national conformity rule, ongoing transportation programs are placing much higher consideration on air quality than in the past. This consideration mostly takes the form of heightened coordination and collaboration between the RTC and the Department of Comprehensive Planning on population and emission forecast assumptions. In several cases, the RTC has helped fund air quality studies in order to develop more accurate and longer term information on motor vehicle emissions. However, the RTC's primary role is to provide transportation services to Clark County visitors and residents. As such, their primary consideration when reviewing transportation projects is not air quality but the impact a project will have on mobility. The RTC does have a highly creative program (CATMATCH) designed to provide incentives for driving less and reducing motor vehicle emissions. RTC also funds numerous transit, bicycle and park and ride lot projects. Some interviewees would prefer to see greater emphasis on air quality as a consideration, particularly in NDOT projects, where an example of high performance construction dust control could be very effective. One citizen interviewee took issue with the way that RTC calculates construction dust in conformity assessments and believes it could be done much more accurately.

Reasonableness of the Timeframe to Develop and Implement the Air Quality Control Measures

This question raised the concern that the federal Clean Air Act (CAA) might not provide for enough time to adequately prepare and adopt measures to attain the standards. This also was meant to stimulate discussion about USEPA's role in the process. Somewhat surprisingly, an overwhelming number of responders from all sectors believed that the deadlines and requirements of the CAA were fair and that it was more a matter of Las Vegas making a timely effort to meet those deadlines. Many felt that the CO SIP was quite fixable and the standard could be met soon. One problem raised several times was that the standards and test methods under the CAA were often focused on studies and techniques used in the Eastern states and that USEPA needed to better understand Western, desert situations and be more flexible. A concern regarding the time frame came from a government responder who felt the time was too short to develop a new SIP after the area was raised to a higher classification. Many expressed that if USEPA hadn't begun to aggressively focus on Las Vegas and its attainment problems, little effort to develop adequate clean air plans would occur.

Potential Barriers to the Implementation of the Air Quality Program

The reactions to this interview question can be categorized in three areas:

- General concerns are impacting the effort to carry out an expanded program
- Specific activities in the planning and implementation of the program
- Special interest and government oversight activities interfering with the program

General

Governmental and public responders saw the extremely rapid growth and future growth projections in particular as a major impediment to attaining and maintaining certain standards for air quality. It is recognized, of course, that these very difficult challenges to attaining and maintaining clean air make the implementation of control programs in Clark County much more complex than most other areas of the country. Lack of adequate staffing, technical expertise, and space for those employees responsible for carrying out the air programs was identified. Related, organization and morale problems were identified by public and some governmental interviewees as a hindrance to running an effective program. All sectors had interviewees who criticized the adequacy of both data and the public outreach program. A key barrier was the need for a more proactive outreach program was suggested. The three interviewee sectors saw as a barrier the enforcement priorities of the CCHD and some believed that certain managers and staff did not have a strong environmental ethic. Finally, frequently changing requirements for new SIPs or focusing on different categories of activities were identified as a potential barrier.

Activities

An immediate barrier that many responders in both the governmental and business sectors raised was that of successfully developing and approving a dust rule for vacant disturbed lands. Several mobile source barriers were identified. These included the need to better enforce upon non-registered vehicles, develop an approvable mobile source emissions budget for conformity and SIP development purposes, and fully implement the current governmental vehicle clean fuel program. A member of the business sector noted that the school districts were a problem in the latter issue.

Agency and Special Interests

USEPA was cited frequently as a major barrier to successfully implementing the air program in Clark County. Several governmental responders believed that USEPA was too slow to take action on the SIP submittals and thus, caused the sanction's crisis. Four governmental officials noted poor or untimely SIP guidance by USEPA, though another governmental responder felt that USEPA was providing good guidance. Some commented that EPA overall does not provide significant guidance to deal with desert-type SIP issues as it more frequently focuses on the "east coast" problem. Public and government interviewees noted USEPA's lack of follow up, such as in the 1996 Program Review, as a potential factor in implementing any new stringent programs. They also felt that in the past USEPA placed too much emphasis on stationary sources when mobile and area sources are affecting PM and CO attainment. A significant number of government, public, and business responders cited special interest or politics as a barrier to running a good air program. The resort industry and land developers were mentioned most frequently on this issue.

Public Acceptance of Ridesharing, Transit, and other Transportation Measures

The most significant discussion under this heading was over the proposed light rail and a fixed guideway system for the Strip. Most government and business responders felt the concept was important but differed on the location and type of system. Also, some favored extension to the

McCarran Airport while others believed that was unlikely due to the power of the taxi interests or the fact that most persons would not want to carry much baggage to, on, and from a light rail vehicle. The business sector believed that the Strip was particularly well-suited for transit as it had a concentration of lower-paid workers and many would find the transit alternative commute less expensive. Carpool/bus lanes were suggested by government interviewees, but generally felt that toll carpool lanes would not be successful in Las Vegas. One business responder advocated increased telecommuting. Several government interviewees encouraged Rideshare incentives. Congestion was noted by most as a growing concern in Las Vegas.

Public Perception of the Air Pollution Problem in Las Vegas

Urban haze and visibility problems are by far the most commonly identified perception by the citizenry of the Las Vegas air pollution problem. Five governmental and three business responders cited this as the top issue. Similarly, business and governmental interviewees identified public education needs as important to getting more public support for the air quality program. Many noted that new residents seemed more upset about air quality than long-time residents did. Government regulator problems were also high on the list of identified perceptions. Lack of trust, bad air quality, and CCHD management problems were identified as poor government practices. Specifically mentioned was the perceived conflict of having an outside Counsel to the CCHD. Finally, one government responder believed that the citizens were not very involved or interested in air quality issues.

The involvement of the business community in addressing air pollution issues in Las Vegas was extensively discussed during the interviews. Governmental, and especially the business community responders stressed how heavily involved industry has become in finding solutions to the air quality problem. The coalition of developers that have developed the proposed dust rule for vacant disturbed land was cited as a good example. Some developers noted that they are just responding to the housing needs resulting from all the growth in Las Vegas, and should not be criticized for causing the air pollution problems. One business responder believed the trucking industry was not working closely enough with the regulators to improve air quality.

The views solicited on public perception of the air pollution problem, while not directly impacting air pollution control strategies, are an important indicator of support for solutions to the growing air pollution problem in Clark County.

Growth Issues and their Impact on Air Pollution in Clark County

There was no denial that growth has impacted air pollution in Clark County. One government responder noted that "growth was inevitable and infinite." It was not felt that water supply would be a limiting, future factor in the valley's growth. A business responder felt that 8-hour ozone and PM problems would continue due to the increase in mobile sources. The public sector advocated more infill development, but one government interviewee believed that current growth occurs at the edge of developed areas and little vacant infill land is available. An NDOT responder noted that "freeways don't induce growth, but that growth is generally far ahead of new transportation systems in Las Vegas." Finally, it was projected by several that no new casinos would be developed in next five years in Las Vegas, but expansions of current hotels are possible.

While few suggestions were made by interviewees on limiting growth in Clark County, the comments and attitudes on the role of future growth serve to identify the need for long-range solutions to the air pollution controls and transportation needs of the community.

RESULTS OF INTERVIEWS WITH MANAGERS OF EFFECTIVE PROGRAMS AT OTHER LOCAL/REGIONAL AIR POLLUTION AGENCIES IN THE COUNTRY

The Purpose and Selection of Agencies

As input to the evaluation of the Clark County air program, the team identified a small number of other air programs, conducted some basic information on their organizational structure, and interviewed senior managers. The goal was to see if other programs in the country had organizational and management characteristics that were successful for them, learn why they worked, and determine whether any might be transferable to the Clark County situation. The team did not intend to conduct a scientific survey of local air agencies or expect to identify a "model" organizational and programmatic structure.

Agencies were selected primarily for their reputation for overall management effectiveness. A lesser criteria was whether air quality problems were similar to those in Clark County and whether the programs served large and growing urban areas. The effort was lead by team member Bill Sylte, a former state air director in California and past President of STAPPA (State and Local Air Pollution Program Administrators), a national organization of state air directors. Mr. Sylte consulted with Bill Becker, Executive Director of STAPPA/ALAPCO (ALAPCO is the Association of Local Air Pollution Control Officials) in identifying effective local and regional air agencies. While a number of agencies stood out, 5 were selected for data collection and telephone interviews. Interviews were completed with 4 of the 5 selected agencies; one was eventually dropped because of the unavailability of senior management. The 4 agencies were:

1. The Puget Sound Clean Air Agency (Seattle) - The independent regional agency covers 4 counties in the heart of the Seattle/Tacoma metropolitan area. Its service area has a population of about 3 million, with an expected growth rate of about 1.3% annually. The agency has 70-75 people and a budget of about $7 million. Air quality has improved and the area now attains all NAAQS, based on monitoring data. A redesignation to Attainment for PM_{10} is pending. The area is very close to violating the pending new 8-hour ozone standard. For public health reasons, the area has set the goal of reducing 24-hour concentrations of $PM_{2.5}$ to 25 ug/m^3, far below the proposed USEPA standard of 65 ug/m^3.

2. The Ventura County Air Pollution Control District (Southern California) – Ventura County is immediately northwest of the Los Angeles metropolitan area and is experiencing significant growth. Its population is about 750,000 and its growth rate is in the range of 1-2% annually. The voters in Ventura County recently enacted growth boundaries around the incorporated cities, which may limit future growth rates. The agency is independent of County government. It has 66 people and a budget of about $7 million. Air quality has improved considerably in Ventura County so that the area now attains all NAAQS except for the 1-hour and pending 8-hour ozone standards. Concentrations of $PM_{2.5}$ are below the proposed 24-hour standard but are too close to the proposed annual standard to call.

3. The Regional Air Quality Council (Denver) - RAQC is a state-created regional entity that covers 6 counties in the Denver metropolitan area. The Denver area has a population of about 2.2 million and is projected to grow to 3.2 million over the next 20 years. RAQC is very small, with a staff of 5 persons and a budget of about $600,000. However, the RAQC coordinates and relies on close working relationships with the Colorado Air Pollution Control Division and the Colorado Air Quality Control Commission to accomplish its mission. In terms of NAAQS, air quality has improved in the Denver area. Monitors show attainment of all current and proposed standards, though maintenance plans are now being processed for CO and PM_{10}. Impaired visibility remains a problem.

4. The Regional Air Pollution Control Agency (Dayton, Ohio) - RAPCA is a regional agency that covers 6 counties in the Dayton, Ohio metropolitan area, which has a population of approximately 950,000. RAPCA has a staff of 38 and a budget of about $2.5 million. Organizationally, it functions within the Montgomery County Health Department and provides services to the other 5 counties by contract. The agency has limited independent authority but carries out and enforces state permit and control requirements. Dayton attains all current NAAQS, but has had violations of the proposed 8-hour ozone standard. They attain both proposed $PM_{2.5}$ standards.

The individuals interviewed are listed in Appendix C.

Results of the Interviews

Each of the agencies was successful, but each operated in a different political and organizational environment. Their size and organizational structures varied widely. Puget Sound and Ventura were organized along traditional lines with a strong staff manager reporting to a board of directors consisting of city and county elected officials. Both have broad program authority and substantial independence from other units of government. On the other hand, the Denver Air Quality Council and RAPCA-Dayton are players in a complex programmatic structure. They are highly dependent on their state air agencies and have little independent authority. Our conclusion was that effective programs can operate with a variety of organizational structures as long as the structure is tailored to the traditions and political culture of the area.

Political level leadership is extremely important to setting the policy expectations of an effective program. In Seattle, Denver and Ventura, local elected officials took a strong interest in addressing air quality problems, supported staff efforts, and brought private and public sector interests on board. In the case of Denver, the willingness of several Governors to lead, provide resources, and hold staff accountable for performance has been extremely important to making an awkward structure effective.

Strong staff management has been a key ingredient in the success of all 4 agencies. Each manager interviewed was articulate, knowledgeable, confident and proud of his/her agency. Each had strong and consistent convictions about managing people so that staff stayed well informed and invested in the success of the agency. Each thought they had effective ways of dealing with disputes and dissatisfied individuals. None reported experiencing chronic staff morale problems or whistleblowers.

Enforcement programs can be severely weakened by even the appearance of political influence on staff handling of individual cases. Both Ventura and Puget Sound reported that their boards had a strong tradition of "hands off."

Competent and consistent day to day performance is the best means of establishing and maintaining credibility with regulated industry, interest groups and the public. But public outreach was also important because it provided the opportunity to correct misunderstandings and resolve minor issues before they escalated to major status. Each agency had very open, consultative processes for developing SIP revisions and regulatory requirements. Ventura, Puget Sound and Denver have also made use of highly visible citizen advisory boards. While workshops, notices, task forces and other devices consumed time and staff resources on the front end of the processes, the investment paid off in better definition of issues, more expeditious adoption processes, and more effective control programs.

State and/or USEPA technical assistance and policy oversight can be constructive. The effective agencies work hard at meshing their resources with those of their state agencies so there is a well-understood division of labor that prevents duplication of effort. All agencies experience occasional disagreements with oversight agencies, particularly USEPA. They were proactive in communicating with their state agencies and with their USEPA Regional Office. The managers' view was that it is better to ferret out problems early and try to resolve them rather than face surprise SIP disapproval that can lead to sanctions.

CHARACTERISTICS OF EFFECTIVE LOCAL/REGIONAL AIR PROGRAMS

Based on the combination of information sources described earlier, the team has selected the following characteristics to describe an effective local air agency.

Accountable Political Level Board/Governing Authority

Most local or regional air pollution control agencies have governing boards that meet periodically. Members are typically elected officials, though some boards have non-elected members who are appointed because they meet prescribed qualifications. Elected board members are usually city council members or county supervisors. The governing boards of effective programs:

- Are visibly accountable to the general public in the area of their jurisdiction. They are elected officials from cities and counties in their jurisdiction and/or are appointed persons directly responsible to elected officials.

- Have an interest in air quality programs, public health and regulatory issues. They are provided technical information and legal advice that is sufficient to allow them to understand issues and render informed policy decisions.

- Delegate authority for day-to-day operations to a staff executive. Hold staff executive accountable for carrying out board policies, implementing effective regulatory programs, and meeting deadlines.

- Discourage board member involvement in decisions on individual enforcement cases and permit conditions. Do not intervene on behalf of companies that they might favor or have business relations.

- Possess sufficient legal authority to adopt and revise the regulations needed to operate a "core" air quality program in their area. Normally a core program involves stationary source permitting, enforcement, SIP development, and support functions like air monitoring and emissions inventory.

- Have administrative rules that meet federal and state requirements for public access to the regulatory process e.g.; provide public notice, opportunity to comment, open meetings, maintain record of decisions etc.

- Possess the authority to effectively review and approve annual budget for air program.

- Are small enough to allow individual members to participate and to conduct business efficiently.

- Meet as needed periodically throughout the year to allow timely decisions.

Effective Staff Management

Air pollution control agencies are a challenge to manage effectively because they have substantial regulatory powers, often become involved in controversial issues, deal regularly with complex scientific and technical issues, and yet are like any government agency or private business in that they face a host of traditional management issues. These challenges require senior managers to possess an unusual combination of skills. Effective air agency staff executives:

- Possess refined professional management skills. As a minimum, this requires good communication skills and the ability to motivate his/her management team and staff by earning and maintaining the trust of nearly all the staff, nearly all the time. Effective staff executives are consistent in the exercise of their authority, set high standards of performance, and hold managers and staff accountable for high quality and timely work. They also tend to be personally accessible, to place a high priority on keeping management and staff well informed, to encourage discussion and debate within the staff family. Where there are serious instances of staff unrest, they quickly deal with the issues and keep both staff and public informed of decisions where appropriate.

- Have interdisciplinary knowledge of the air programs they manage. Many have engineering or scientific degrees, but what is more critical is the demonstrated aptitude to absorb scientific information, apply legal principles, and deal with inter-governmental program policy issues.

- Earn the confidence of his/her governing board by consistently operating within board policy guidelines and carrying out delegated authority effectively. Effective staff executives keep board members informed of issues that affect their constituents but resist the incursion of board members into individual enforcement cases and permit decisions.

- Show discretion when dealing with controversial issues. Effective staff executives tend to provide the press and public with accurate background information but allow board members to take the lead on high profile issues. They do not allow the board to be surprised by negative issues.

- Earn credibility with regulated industry and public interest groups by being willing to listen to and consider their viewpoints. Effective staff executives are usually perceived as being moderate and fair advocates for clean air.

- Demonstrate the ability to take a longer term view of issues and goals. This perspective allows them to plan several years ahead and collect the resources needed to address problems that cannot be solved in shorter time frames.

Air Agency Staff

Air programs require a variety of skills, but the emphasis is on scientific knowledge and technical skills. To be effective, air programs must operate from a basis of accurate and reliable data and information. In addition, air agencies operate in a public sector environment in which they must deal with the public on a day to day basis and work cooperatively with other agencies. Accordingly, staff at effective agencies:

- Are well informed and current in their areas of expertise. This requires a personal commitment to excellence, regular training opportunities, and attendance at seminars and conferences that allow them to interact with peers.

- Are stakeholders with a high level of investment in the success of the agency. They are interested in issues and policy, work to stay informed, and provide constructive input to their colleagues and supervisors. They know that their criticisms will be heard but trust their staff executive's ultimate judgement. They take deadlines seriously.

- They earn the trust of the general public by being perceived as mission oriented. Staff maintain credibility with interest groups and are considered by the regulated community to be technically competent, accessible and fair.

- Work effectively with other government agencies. They are advocates for their own agency interests, but respect the roles of other agencies. They will have occasional disagreements with other agencies with different priorities and missions, but they avoid institutional feuds.

- Function in supportive work environments. They are fairly compensated, with salary and benefits that are competitive with similar local private sector compensation for the same skills. Opportunities for promotion and advancement are available and are based on merit. Physical workspace is consistent with local standards. Employees have ready access to the tools and equipment they need to do their jobs. To encourage productivity and employee retention, hardware, software, telecommunications systems, and monitoring and analytical instrumentation are updated when needed.

Compliance and Enforcement

One of the core missions of air pollution control agencies is achieving compliance with the air regulations they administer. Air regulations are voluminous and complex and are an administrative challenge to both the regulated community and the administering agency. Compliance often imposes significant costs on affected industry. Consistent treatment of regulated sources is an important public policy goal because sources that are able to avoid these costs gain a competitive advantage over those that play by the rules. A successful enforcement program must effectively respond and resolve citizen complaints. Effective compliance programs:

- Operate from a well-defined philosophy of how to encourage and achieve compliance. An enforcement philosophy deals with the conduct of inspections, the response to violations, the size of fines and penalties, the role of compliance assistance and other issues. Agencies have a variety of approaches to these issues, but even-handedness and consistency are characteristic of all effective enforcement programs.

- Operate behind a firewall that separates individual cases from political influence. Equitable treatment, based on the principles that all should be treated fairly but that no one is above the law, is critical to program credibility. Even the appearance of favoritism, conflict of interest, or political influence will convince the public that enforcement decisions are unfair and will encourage the regulated community to emphasize avoidance rather than compliance.

- Have adequate resources to conduct site visits and formal inspections with enough frequency to encourage sources to maintain compliance. Effective programs are able to retain experienced inspectors and develop cases in-house, and negotiate settlements. Staff counsel almost always provides legal assistance.

- Utilize a hearing board or similar appeals body to serve as a check on staff compliance practices. Hearing boards of effective programs operate as independent enforcement bodies that are dedicated to carrying out board policies. They tend to support staff decisions unless specific errors have occurred.

Funding Sources and Budget

Local air programs are funded in various ways and exercise various levels of control over their budgets. Adequate funding is critical. In addition, effective programs:

- Have diverse but stable sources of funding. To retain staff and maintain consistency from year to year, the level of funding must be reasonably constant.

- Avoid over-dependence on funding sources that are short term, dedicated to specific goals, and/or contain conditions that are not consistent with agency policies.

- Are able to propose and thereby influence budget priorities. Annual adoption by a board of directors is a good means of insuring accountability, but also helps to assure that budget priorities are adjusted as needed to reflect agency policies.

- In addition to annual budgets, identify funding priorities for following 2-3 years.

External Support and Oversight

Few local or regional air agencies possess the legal authority and resources to address all the sources that contribute to their air quality problems. Except in California, USEPA regulates motor vehicle emissions. There is also federal preemption of controls on locomotives, aircraft, international vessels, and some categories of non-road vehicles. Regional agencies control transportation projects and land use. Vehicle I/M programs are often operated at the state level, and not always by the state air program. In addition, state and federal air agencies can provide technical resources, like regional modeling, population and economic projections, and vehicle inventories, that are unavailable or impractical to duplicate at the local level. Effective air agencies:

- Are able to integrate federal and state control measures and requirements with their own measures to form cost-effective SIP attainment and maintenance strategies. Fully understand importance of federal and state planning deadlines.

- Are proactive with their USEPA region in an effort to minimize policy disagreement, solicit timely comments and action on SIP submittals, and obtain technical assistance when needed. Effective agencies are seldom surprised by USEPA actions.

- Work cooperatively with regional transportation and land use agencies and obtain data and information from these agencies when needed.

- Have state air agencies that provide policy oversight when required and technical support.

Public Outreach

Air programs affect a wide variety of local interests, including but not limited to, industrial facilities, land developers, transportation proponents, other government agencies, fuel suppliers, truck operators, vehicle owners, and environmental groups. These interests can be the source of political opposition and litigation, or provide support. Effective air agencies:

- Establish citizen advisory groups with which they consult routinely on air quality plan revisions, important regulatory changes and other issues of potential regional significance. Such advisory groups provide community listening posts for both the staff executive and the governing board.

- Operate open and transparent planning and regulatory processes. Effective agencies solicit the early involvement of any citizen or group with an interest and perceived stake in the outcome. They use publications, community meetings, workshops, task forces, web sites and other devices to provide the opportunity for input. They also use these forums to educate the public.

- Share air quality data and other information on air programs with the public regularly. Most effective agencies publish regular newsletters and maintain web sites. Information on permits, citations and enforcement case outcomes is freely shared.

- Operate permit programs with a strong "customer service" orientation, with a special emphasis on assisting small businesses. Effective agencies have a friendly style, explain requirements with limited technical jargon, and are responsive to reasonable requests from sources, consultants, the press and citizens.

- Provide aggressive public education program, including assistance to schools, libraries, and local community organizations. Provision of a "speaker's bureau" is desirable.

COMPARING THE CLARK COUNTY AIR PROGRAM TO THE CHARACTERISTICS OF EFFECTIVE LOCAL AND REGIONAL AIR PROGRAMS IN OTHER AREAS

NUMERICAL RATINGS BY THE ENVIRON TEAM OF INTERVIEWERS

Table 5-2 lists the various effective local/regional air program characteristics, discussed in detail in the previous section, and the average rating that was assigned to Clark County's overall air program by the members of the ENVIRON team. The four members of the ENVIRON team who participated in the ratings represented four separate consulting firms and were all extensively involved in the interviews. The ratings were from 1 to 5, with 1 representing the lowest possible rating and 5 the highest. The "category" score represents the team's average ratings for the various characteristics within the category, equally weighted.

These ratings resulted from the extensive interviews of the various governmental, industry, and public stakeholders during the spring of 2000. Raters were asked to only address those characteristics for which they had knowledge of in Clark County. Further review of various studies, agency data, and on-site visits also influenced the ratings. Although the rating on any individual characteristic reflects the Clark County air program in totality, the two agencies that likely most influenced the ratings were the Air Quality Division of the Clark County Health District and the Air Quality Team of the Clark County Comprehensive Planning Department. No attempt is made here to individually rank the two agencies. While this may be informative and at least one agency believed that combining the numerical ratings unfairly characterized its competence, our intent is to evaluate the totality of the air quality program. As such, it includes not only the actions within an agency but, very importantly, the results of inter-agency working toward the common goal of attaining and maintaining the NAAQS.

Table 5-2. Average rating by program characteristics.

CATEGORY AND CHARACTERISTICS	TEAM RATING
I. Accountable Political Level Board/Governing Authority	**3.38***
a) Composed of elected officials and/or persons appointed and directly responsible to elected officials. Visibly accountable to public	3
b) Have interest in air quality and provided tech. info. and legal advice	3.2
c) Possess legal authority and operate core program of permitting, enforcement, SIP development, and tech. support functions	3.3
d) Have admin. rules that meet state/federal public access req'ts.	3.5
e) Authority to review and approve annual air program budget	4.5
f) Small enough for individual members to participate & conduct business.	3.3
g) Meet regularly and frequently to allow timely decisions	4
h) Delegate day-to-day operations to staff executive officer. Staff accountable for implementing Board policies, but Board members discouraged from involvement in individual permit & enforcement issues	2.3
II. Effective Staff Management	**1.91***
a) Good communications, motivational skills, trust, consistency, personally accessible, keep managers/staff informed, etc.	1.2
b) Interdisciplinary knowledge of air programs. Absorb scientific information, apply legal principles, and deal with inter-agency issues	2.5
c) Operate within Board guidelines, keep Board informed, resist incursion of Board members into individual program decisions	2.5
d) Discretion in controversial issues. Defer to Board when appropriate	1.8
e) Credible with both public and industry, fair advocate for clean air	1.5
III. Air Agency Staff	**2.38***
a) Well-informed and current in area of expertise. Commitment to excellence, freq. training, and attend seminars to interact w. peers	2.6
b) Interested in issues and policies, provide useful input to supervisors	2
c) Mission oriented, considered by regulated as technically competent	2.7
d) Work effectively with other government agencies, avoid institutional feuds	2.6
e) Fairly compensated, competitive w. private sector, modern workspace and equipment, opportunities for promotion and rotation	2
IV. Compliance and Enforcement	**1.75***
a) Well-defined compliance philosophy, consistency	1.8
b) Operate separate from any political influence. No appearance of conflict of interest, favoritism, or avoidance of compliance	1
c) Adequate resources, experienced inspectors, in-house (staff) counsel	1.5
d) Hearing board as check on staff practices. Independent body	2.7

CATEGORY AND CHARACTERISTICS	TEAM RATING
V. Funding Sources and Budget	**4.00***
a) Diverse but predictable sources of funding	4.5
b) Avoids over-dependence on short term sources or for activities not consistent with agency policies and goals	4
c) Staff proposes and influences budget priorities. Annual budget.	4
d) Funding priorities for following 2-3 years are established each year	3.5
VI. External Support and Oversight	**2.43***
a) Integrates federal & state control measures into cost-effective SIP	2.8
b) Proactive with USEPA regional office, solicit comments on SIP drafts	2
c) Cooperate with regional transportation and land use agencies	2.9
d) Have state air agencies that provide policy oversight as needed	2
VII. Public Outreach	**2.30***
a) Establish citizen advisory groups for input on SIPs, reg. changes	2.3
b) Operate open and transparent planning and regulatory processes	2.2
c) Share data with public regularly – newsletters, web sites, etc.	2.2
d) Permit programs have strong "customer service" orientation	2.8
e) Aggressive public education program with schools, civic groups	2

* **Bold** indicates average score per category.

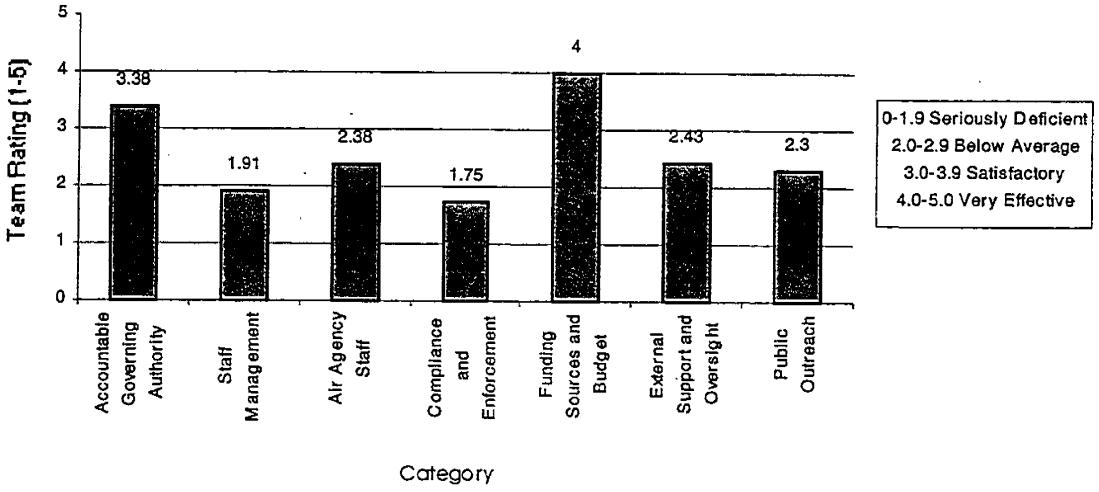


Figure 5-1. Average rating for each major category of effective agency characteristics.

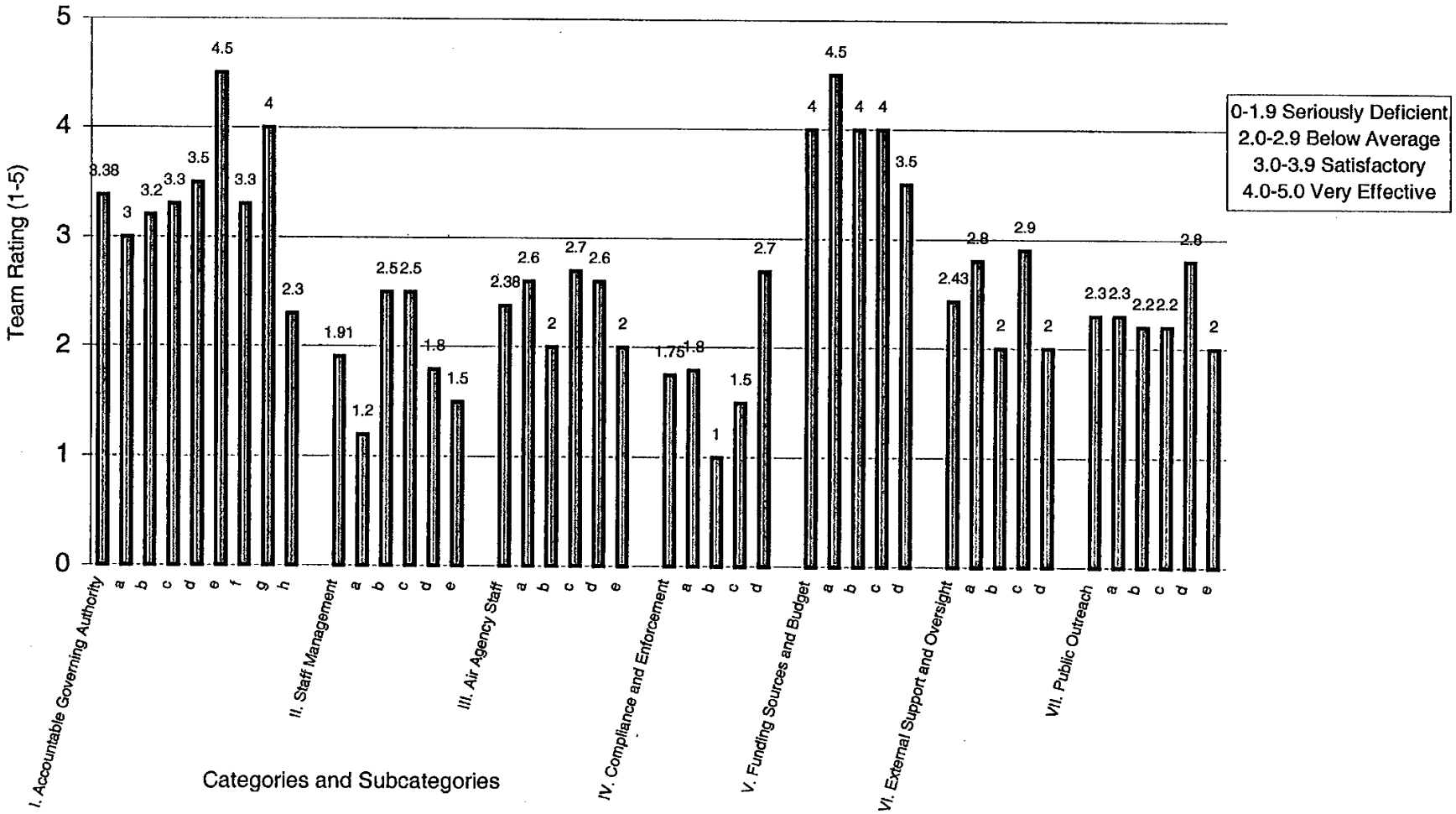


Figure 5-2. Average rating for each subcategory of effective agency characteristics. Refer to Table 5-2 for detailed description of each subcategory.

DISCUSSION OF RESULTS

The ENVIRON team selected the following narrative performance descriptions for use in our evaluation of comparison of Clark County air programs to those of generally recognized effective programs from elsewhere in the country:

Rating Definitions

0-1.9. Seriously Deficient - The team evaluation found that performance is well below average and so far below the performance level of successful agencies that an overhaul is needed.

2.0-2.9. Below Average - The team evaluation found that performance is not satisfactory and is well below the performance level of successful agencies. Significant change is needed.

3.0-3.9. Satisfactory - The team evaluation found that performance meets the norm for local air programs, but that some changes are needed to reach the level of more successful agencies.

4.0–5.0 Very Effective - The team evaluation found that program performance is not only effective but that it compares well with successful agencies.

Summary of Category Averages

Accountable Governing Authority (Rating 3.38, Satisfactory) The team evaluation rated the Boards for the Clark County Health Department and the Comprehensive Planning Department as at or above the norm for composition, legal authority, interest in air quality and budget oversight. The area most in need of improvement is delegation of day-to-day operations to staff management. It should be noted that most of the factors comprising this category relate to legal authority and structure rather than Board performance.

Staff Management (Rating 1.91, Seriously Deficient) The team evaluation rated management slightly below average in interdisciplinary knowledge of air programs and in relations with the governing board. The most serious deficiencies were in staff motivation and trust, discretion on controversial issues, and credibility with the public and industry.

Agency Staff (Rating 2.38, Below Average) The team evaluation rated the staff as below the norm in technical expertise and working relationships with other agencies. They rated yet slightly lower in providing useful input to management and their salary compensation, particularly at the AQD, was low in comparison to staff in similar air pollution control agencies elsewhere in the West.

Compliance and Enforcement (Rating 1.75, Seriously Deficient) The team evaluation rated the hearing board as at the norm, but all other aspects of the compliance program were poor. The lowest rating was for separation from the appearance of conflict of interest, favoritism, or avoidance of compliance.

Funding Sources and Budget (Rating 4.0, Very Effective) The team evaluation found that the budget process and sources of revenue were consistent with very effective air programs. This was the highest category ranking performance characteristics.

External Support and Oversight (Rating 2.43, Below Average) The team evaluation rated the integration of state and federal measures into the SIP and cooperation with regional transportation and land use agencies at slightly below the norm. The relationship with USEPA and oversight by the State were ranked lower.

Public Outreach (Rating 2.30, Below Average) The team evaluation rated all aspects of the public outreach program below the norm and in need of improvements.

In summary, the current program falls short for managing and improving the air quality of Clark County in five of the seven categories of characteristics that represent an effective local or regional air pollution program. The staff management and the compliance/enforcement programs were found the most deficient. Public outreach, external support and oversight, and agency staffs were also found less than satisfactory. The findings of this section, along with the results of the interviews of both Las Vegas air program stakeholders and managers of effective air programs elsewhere in the country provided the ENVIRON team with key data to make the recommendations for improvements.

RECOMMENDED ORGANIZATIONAL CHANGES TO ADDRESS CLARK COUNTY AIR PROGRAM DEFICIENCIES

This section makes three specific recommendations for organizational changes to facilitate a more successful air pollution program in Clark County.

Recommendation 1:

Introduction

The extensive investigation by the ENVIRON team on the current Clark County air program has uncovered many deficiencies and suggestions for correcting the program. Likewise, there have been many positive comments about the desire of most stakeholders to see that the health standards for air pollution are met in a timely, yet cost-effective manner. However, the most prevalent comment received throughout the investigation was the need to consolidate the air pollution control effort into a single agency with an accountable governing authority. Recommendation 1 suggests the possible composition of such a Board. Recommendation 2 proposes an organizational chart for the agency that would report to the Board.

Recommendation

The State legislature should establish a single agency, governed by a Board whose general composition is outlined in the legislation. The size of this board should be less than ten members and have an odd number of members to prevent deadlocks due to tie votes. ENVIRON has found that Boards having more that ten members tend to have more difficulty reaching consensus and maintaining a quorum for voting on issues. The majority of the Board

should come from state or locally elected officials, though the Governor would appoint one member from a State agency and one from the "public at large." A suggested composition, established under the legislation, is as follows:

- Governor's agency appointee, coming from a state agency actively involved in air pollution[1]
- Clark County Board of Commissioners representative, ideally the Chairman
- One elected representative, Clark County Regional Transportation Commission
- Two elected representatives from incorporated cities in Clark County
- Two appointed members from private sector
- One member, appointed by the State legislators from Clark County
- One member, appointed by the Governor, from the public sector

The new Board would terminate the existing Clark County Air Pollution Control Board, established under NRS 244.361 and Clark County Code, Title 9, Chapter 9.08.

Discussion

A very important component is the composition of the governing Board of this new agency. Our proposal attempts to balance a more active role by the State with that of having the majority of the members comprised of elected members from the county. This includes having the elected officials responsible for appointing the two private sector appointees. This increases the accountability to the citizens of the county and is consistent with the tradition of local control in southern Nevada. It is suggested that the members serve on the Board for staggered terms of two to four years, striking a balance between continuity and introduction of fresh perspectives. The Board members should elect their own chairperson rather than having that rigidly established by State legislation. The Board would select the Executive Director of the agency and she/he should serve at the pleasure of the Board. This allows the Board to hold the Director accountable and ensures that the Director is operating with the confidence and support of a majority of the Board at all times.

It may be useful to briefly discuss the likely candidate agencies and sectors for the Board. With regard to the State agency official appointed by the Governor, the most logical agency would by the State Environmental Commission with emphasis upon the Nevada Department of Environmental Protection. Other possible choices would be the Department of Motor Vehicles and Public Safety, and the Department of Transportation. The two elected officials from cities might come from the city councils or the mayor. ENVIRON suggests the candidate cities be limited to those in the Las Vegas non-attainment area, i.e., Las Vegas, North Las Vegas, or Henderson. The two private sector members, appointed by elected officials in Clark County, would most likely come from the construction industry, gaming, transportation, consulting, or medical profession. The public sector appointee might come from an environmental organization, civic group, or academia. The State legislative representatives from Clark County could meet and select an appropriate Board member. This might be a State or local elected official, another member from the public or private sector, or even a fellow State legislator.

[1] The Nevada Department of Agriculture currently has an important role in air pollution management, through their leadership in the Fuels Program and other key activities. As such, their roles and responsibilities should be reflected, in some manner, in the administrating boards composition.

Creation of a single agency should greatly improve air quality program accountability, communications among planning and regulatory functions, and allow the governing Board to focus strictly on air quality issues. Ideally, the structure of the agency could be optimized for improved performance, salary and compensation issues corrected for retention/attraction of professional staff, and effective outreach programs could be created. Most important, the single agency should be able to attract very effective managers.

Since the initial draft report was provided to the SB 432 Subcommittee by ENVIRON, there appears to be a very concerted effort by Clark County and Southern Nevada Cities to develop an Interlocal Agreement to establish a single agency to address some of the findings in the report. This Final Report by ENVIRON will attempt to discuss and comment on these efforts as they relate to our original six recommendations. As no formal agreement has been concluded at the time of the Final Report submission, our comments must be based on the most recent draft findings of the interagency effort.

With relationship to Recommendation 1, the latest staff working draft would establish a single agency, tentatively called the Southern Nevada Air Quality Management Authority. It would have at least one elected official representing Clark County and each of the five incorporated cities within the county. Each member would have equal voting status. We have previously recommended that the State of Nevada, have a voting position on a newly formed board. As discussed below, as well as later in this report, the proposed inter-local agreement provides for State of Nevada program participation and our view in an alternative fashion.

ENVIRON believes creating a single agency will move Clark County in a very positive direction to correcting and aggressively dealing with its serious air pollution problem. We have some concern over whether a representative of the general public and of the business community, perhaps appointed by the legislature or Governor, should not be added to the governing Board. A suggestion was made by one commenter to our draft report recommendation that the General Manager of the Regional Transportation Commission sit as an ex-officio member of the new air Board, and Executive Officer of the new Board sit as ex-officio member of the RTC. We feel that recommendation has merit. However, these Board membership concerns may be alleviated if the current proposal to establish an Executive Advisory Committee and a Technical Advisory Committee come to fruition with the suggested representation in the preliminary staff report. The Executive Advisory Committee would, among others, include the RTC General Manager and, quite importantly, a representative of either the NDEP, the DMV, or Division of Weights and Measures. The Technical Advisory Committee would include 10 members with specific constituencies such as the environmental community, developers, manufacturers, transportation (State) and transport industry, land management (Federal), and public health. An eleventh member would represent the general public and be appointed by the Governor. If these two committees play an active role in the support of the new Board, ENVIRON believes that many of its recommendations on the organization composition of the governing Board will be satisfied.

There is also some question over the inclusion of Board members from the cities of Mesquite and Boulder City as they lie outside the non-attainment area of Clark County. Conversely, these members probably represent areas that will be affected by future air pollution control decisions, designated planning areas for future pollutants, and likely to be affected by the rapidly expanding urban growth within the county.

Recommendation 2:

Introduction

Recommendation 2 proposes a basic organizational structure for the new, single-purpose air quality agency that will function under the Board recommended in the previous section. Combining the current split of responsibilities between the Air Quality Division of the CCHD and the Air Quality Team of the Comprehensive Planning Department of Clark County will be a challenge. ENVIRON strongly recommends a professional management consultant be employed to orchestrate the actual organizational setup. ENVIRON also recommends that the Executive Director be selected using a national management recruiting effort. Based on the current problems identified in this investigation, ENVIRON believes the new Executive Director must have strong management skills that compliment the technical/program knowledge that will be present with the assistant directors of the organization. As noted in the previous section, effective staff management of the current air program rated near the bottom of the ENVIRON team ratings on the effective program characteristics.

Recommendation

Based on evaluation of effective air program organizational structure elsewhere in the country, and the numerous comments raised about organizational structure and responsibilities of the Clark County air programs, Figure 5-3 is a suggested organization chart for a new, single purpose air agency in Clark County. It should consist primarily of the staffs of the current Air Quality Division of the Clark County Health District and the Air Quality Team of the Clark County Comprehensive Planning Department. It would be expected that some positions could be streamlined due to duplicative functions in current air quality organizations, but also that several new positions will need to be created at both staff and management levels to conduct the broader range of responsibility in this new organization. Staffing levels, based on projected needs and deficiencies identified by CCHD managers and staff, and the review of current staff levels for the Air Quality Team at Comprehensive Planning, would likely total approximately 100 positions in 2001. Both of the two merging organizations are currently supported by the larger organizations in which they exist. This fact, along with the obvious growth in regulatory and planning responsibilities as Clark County begins to implement a much more aggressive PM and a proactive public outreach/ education programs, will likely lead to increase in the staffing and funding needs even after accounting for some efficiencies from the streamlined operations.

Discussion

The proposed organization is not too different than many similar governmental establishments. It consists of an Executive Director, appointed by and serving at the pleasure of the Board, with several staff offices reporting directly to the Director. A seven member hearing board, discussed in Recommendation 3, would also report to the Board of the new agency. The four main operating divisions include administrative support, planning, field operations, and enforcement/compliance. An Assistant Director, who is normally selected by the Director with the concurrence of the Board, heads each of these line operations. All line managers should be chosen by the respective Assistant Director and concurred upon by the Director. The sub-level offices to the various operating divisions are normally called branches or

offices. An alternative to "director" titles would be "manager" as a title with the Executive Director becoming the "General Manager."

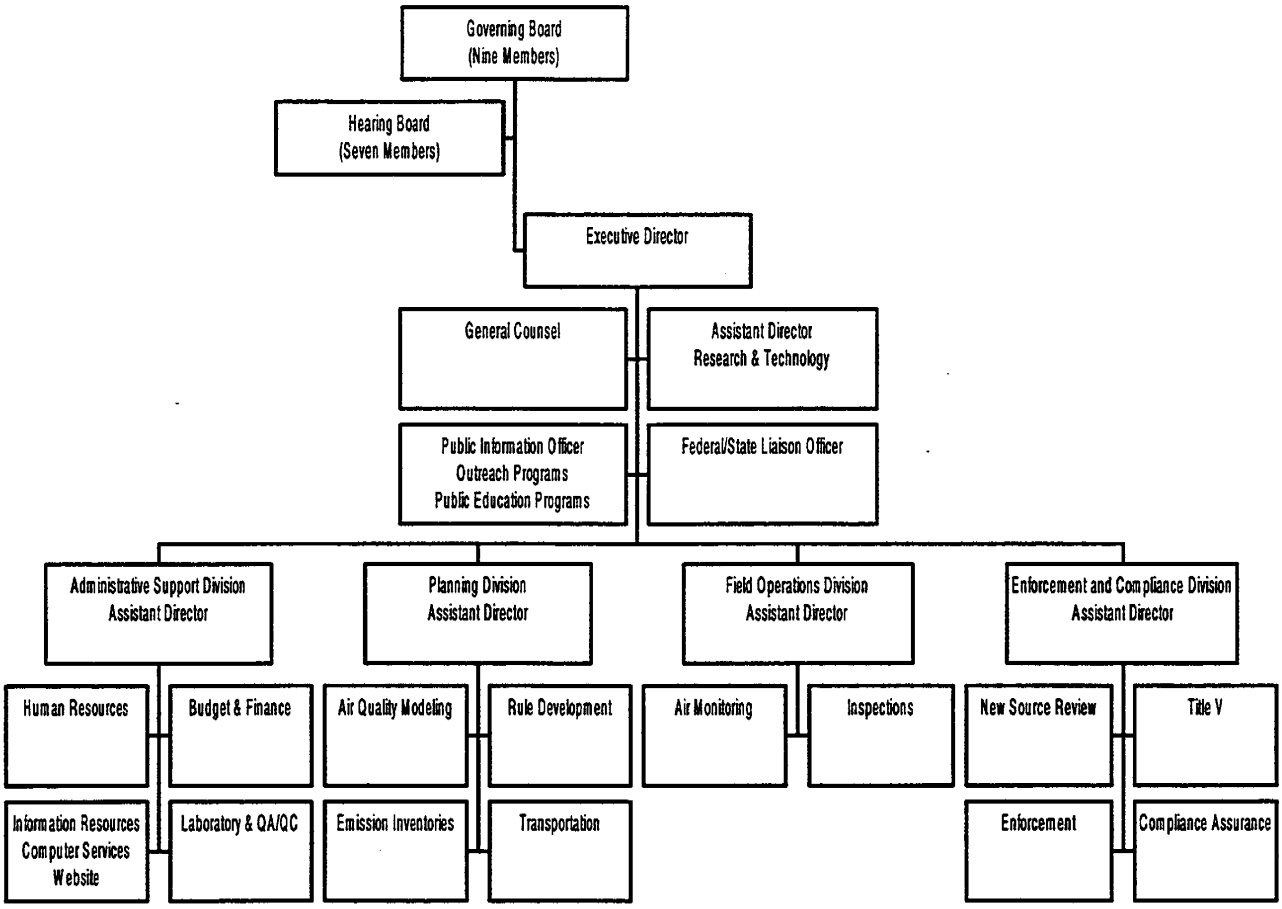


Figure 5-3. Suggested single agency organization for the Clark County Air program

The General Counsel's office should be headed with a full-time, in-house staff counsel. The office would likely have a small number of staff attorneys as well. This is the normal organization of the legal staff of most air pollution agencies in the nation and provides consultation to managers and staff on difficult legal issues, and advises the Executive Director and the Board on legal matters of broader significance. Having an in-house legal staff avoids any public perception of favoritism, conflict of interest, or political influence. It would likely be more cost-effective as well.

The Assistant Director for Research and Technology plays an extremely important role in advising the Director and the Board of the scientific validity of regulatory and policy decisions. The incumbent should have extensive experience in air pollution control technology as well as the status of current research efforts elsewhere in the nation. He/she should have credibility with the technical managers and staff, and ideally have prior experience in a senior position of an air pollution control agency.

The Public Information Officer must be highly skilled in dealing with the wide variety of constituents that are impacted by the air pollution program. Experience in dealing with the media is very important to this position, and both the Executive Director and the Board members should have confidence in the PIO's ability to handle press inquires confidently and on-the-spot. A criticism frequently surfaced in the interviews in this study was that the current air quality program within the CCHD was more reactive than proactive. The need for expanded public outreach and education has been raised numerous times over the past ten years by USEPA audits and citizen complaints. This office will need a staff of about four persons initially to reverse this reputation and actively support and educate the public on the many new regulations and policies necessary to attain the standards in Las Vegas.

Finally, the Federal/State Liaison Officer will be the focal point for the myriad of State and Federal agencies that will interact with the new air program for Clark County. Federal counterparts, such as the USEPA and FHWA, have similar positions already established and having such a person in Clark County's air program will undoubtedly improve relations. This office will frequently serve as the Board's "listening post" for developing key national and state policies that will soon affect the agency. Based on experience in other agencies of this size, a Liaison Officer and special assistant should be sufficient to initially handle these responsibilities.

Regarding Recommendation 2, the latest staff working draft recommends employing an Executive Director to manage the new agency. The position would be appointed, and serve at the pleasure of the Board. There would also be established a Transitional Management Committee (TMC) to guide the creation of the new agency in the merger of the duties and staff from the CCHD's Air Quality Division and the DCP's Air Quality Team. The TMC would have the lead to recruit and recommend an Executive Director candidate to the Board. It would also recommend staffing and funding of the interim organization until the Executive Director position was filled.

Considerable time has been spent by the staff working on the Interlocal Agreement on the details of the transfer of authority to the new agency and the various staffing and support issues identified by the ENVIRON draft report. The staff has also outlined some of the procedures, funding and budget authority, and powers of the new agency. The new agency would come into existence upon the approval of the various participating governments. An

extensive PERT chart has been created that outlines in detail the steps to bring the new agency into operation by July 2001.

ENVIRON proposed a "strawman" organizational chart for a single-purpose air quality agency in Clark County. We recognize that the management team overseeing the transition to the new agency can best develop the actual organization structure.

In summary, it would appear that if properly funded and implemented, the staff-proposed agency can organize and merge staffs in a satisfactory manner to remedy many of the concerns contained in ENVIRON's original recommendation. However, key to the entire process will be the active, nationwide recruitment of a strong, management-skilled Executive Director for the new agency.

Recommendation 3:

Introduction

The current Air Pollution Control Hearing Board consists of seven members. It was established by Clark County Code Title 9, Chapter 9.08.090 and established under NRS 244.361. The mandated backgrounds are one attorney, one engineer, one general contractor, and four citizen members. Currently, only the engineer member is vacant. The background of the four citizen members are (1) gasoline retailer, (2) environmental scientist, (3) retired public health administrator, and (4) health and information systems. Members serve for a three-year term, and can be re-appointed. Terms expire on staggered dates to assure consistency. Most members have been on the hearing board since the mid-1990s, although the attorney member has served since 1982.

The independent hearing board considers requests for variance relief, permit revocations, abatement orders, and appeals by permit applicants, or by interested third parties, concerning the issuance or denial of permits by the air Board. The hearing board cannot modify rules, exempt businesses from complying with a rule, grant variance from a violation of the public nuisance law, or review a violation notice in any way.

Recommendation

Maintain the hearing board composition of seven members, but would suggest requiring one of the current "citizen members" be eliminated and replaced by a mandated "medical doctor."

Discussion

ENVIRON compared the make-up of the current hearing board with the legal requirements for hearing boards of air pollution control agencies in California to see if any major differences exist. Hearing boards in California consist of five members. The specific backgrounds of the members, mandated by law, are as follows: an attorney, a professional engineer, a medical doctor, and two members of the public. ENVIRON believes that the basis for of the air pollution program actions are normally based on health, and it would be useful to mandate a medical doctor be one of the members of the Clark County air pollution hearing board. While

California agencies have a mandated five-member hearing board, ENVIRON sees no overriding need to reduce Clark County's hearing board from seven to five members.

The latest staff working draft does not appear to address changes to the Hearing Board at this time.

RECOMMENDED NON-ORGANIZATIONAL CHANGES TO ADDRESS CLARK COUNTY AIR PROGRAM DEFICIENCIES

This section discusses several recommendations that do not require additional organization changes to address. They focus on some of the more critical deficiencies ENVIRON identified in the current Clark County air program.

PROGRAM FUNDING LEVELS

Introduction

The level of funding needed by the proposed new air quality entity is not yet clear. The ENVIRON team is not recommending major new control measures, pending the collection of better data and information on the potential air quality benefits of new measures. On the other hand, ENVIRON has recommended improvement in a number of program areas that are now deficient, and made several other recommendations that would increase personnel costs. Management of the CCHD also believes that increased revenues are needed and the ENVIRON team generally concurs. The staff expansion that has been occurring in recent years will need to continue to carry out existing programs more effectively, implement tighter new fugitive dust controls, improve enforcement, and keep up with continued growth in such activities as permitting.

Some of the recommendations made in this report will reduce costs. Changes that improve staff morale should increase agency productivity significantly. Increased technical assistance from the State and USEPA will save resources at the local level. Initially, however, the new agency must rely on the existing revenue sources that now fund the Air Quality Division of the CCHD and the Air Quality Team of the Department of Comprehensive Planning.

Recommendation

It is the team's opinion that the net effect of all these changes is in the range of a 10-20% increase in air program cost, but there is too much uncertainty at this point to make a reliable estimate of future revenue needs. Rather than propose a specific dollar increase, ENVIRON suggests that the management study ENVIRON recommended to deal with the details of a new organizational structure also propose a 3-5 year budget plan for the new agency.

Since it is likely that additional funding will be necessary, ENVIRON further suggests that the new air agency look first to increase revenue from three of the four current main sources of funding. These three funding sources have been shown to be politically acceptable and relatively stable from year to year. As the air program grows, there would appear to be room

to increase permit service fees, add $1 or more to the I/M fee, and seek a larger federal Section 105 grant. The fourth main revenue source, County funds that were collected as sales taxes, should be either modified or phased out.

Discussion

The new agency being proposed is no longer a Clark County government entity. It is to be run by a governing board consisting of local elected officials from cities as well as the County, plus a number of appointed members. It may be politically divisive in the long run to continue to rely on a source of revenue that comes from the County alone and presumably has to be appropriated first by the County Board of Supervisors. It may be possible to increase equity by also collecting revenue from local cities, but then the appropriation of funds to the new district would depend on the action of city councils as well as the County board. ENVIRON suggests that the current County contribution be phased out over several years and gradually replaced by other sources of funding that are more directly under the control of the new agency's governing board.

The ENVIRON team believes that priority should be placed on increasing permit and related service fees. These fees are local sources of revenue and therefore, are under local political control. They do not depend on State or federal authorization. These fees also have the virtues of comporting to the "polluter pays" principle and closely tracking actual program costs. Fees in California are much higher so increasing permit and service fees should not put Clark County at any competitive disadvantage for attracting and retaining industry.

The I/M fee is also a reasonably good source of additional revenue. Based on the interviews conducted by the ENVIRON team, there is already considerable support for increasing the I/M fee. Since the public generally understands that the I/M fee is related to the cost of implementing a program to help reduce air pollution, they are more likely to accept a small increase to further air pollution control efforts.

ENVIRON believes that the new agency should seek additional federal 105 funds, but not depend on an increase. There are many interests that oppose any major changes in the funding formula that distributes funds among grantees. In addition, increases in federal 105 support that are approved by the Congress are often earmarked for activities that are a high priority for USEPA.

Special projects and studies of less than 3 years duration can be supported by a variety of funding sources including "excess" I/M revenues, additional fine money, and federal sources like Section 103 funding. The ENVIRON team believes the area needs a considerable investment in collecting better information on air quality and its causes. In the absence of better information the area may have to implement expensive new control measures to reduce ozone and improve visibility without knowing how effective they will be in approving air quality. If the above sources of revenue are inadequate to fund needed studies, other funds should be sought from local or state revenue sources. Clark County government and economic interests have supported taxes and fees to support what they felt were badly needed transportation improvements. If the new agency is successful in earning the confidence of the public and business interests, there should also be support for increasing air agency revenues.

STAFF SUPPORT ISSUES

Introduction

Although it seems a given, providing air quality staff with reasonable working conditions such as adequate work space and up-to-date equipment is an important key to both staff morale and work efficiency. The team observed particularly that the Health District working conditions were not conducive to high morale or getting things done. In some cases, three or four people were sharing offices clearly meant for one person; and individuals reported going for months or years without computers.

Recommendations

Work Space: Studies have shown that individuals experience more of a sense of "empowerment" and higher morale when they have some degree of control over their work space, and particularly when there is an area that is set aside especially for them. Private offices and cubicles can provide this while maximizing the workspace available. Working space at the new agency needs to be adequate for storage of reports and papers needed for performance of duties. For example, a typical cubicle or office might have a computer desk or workstation as well as a writing surface and some filing space. The overall worksite should be consistent with reasonable expectations for growth in personnel and equipment; many of the work space issues at the Health District are a result of unanticipated and very rapid growth in that agency.

Training: Most successful agencies provide training opportunities for their employees. These opportunities range from technical training for advancement in one's area to management or communication skills needed for new or existing managers. The new agency should have a clear policy for training and advancement opportunities. This policy should spell out requirements or guidelines for internal cross-training (for example if enforcement personnel understand the permitting process they may be better able to fulfill their functions as well as to appreciate the work that others are doing). The policy should also spell out guidelines for attendance at conferences or training programs, and the conditions under which the agency will fund or co-fund such training.

Communications: Communications equipment needs to be compatible with that of other agencies such as the RTC with whom the air agency needs to communicate with on a regular basis. Staff also needs to have access to databases containing information on sources or issues they are working with. In some cases it may be beneficial to restrict "write" access without approval but staff should at least be able to readily download information that is publicly available.

Equipment: Staff should have access to up-to-date equipment, comparable with equipment in use at agencies with which they are in communication or with whom they share data.

ROLE OF STATE AGENCIES IN NEVADA

Introduction

In nearly all states that have both state and local air agencies, the state agency plays an active role in overseeing local agency SIP compliance and also provides technical assistance. Appropriate oversight, which the review team views as backstopping local programs, is important because so many air quality activities that are administered at the local level are actually driven by federal and state law, policies and program priorities. It is extremely difficult for an air agency with a local or regional focus to always be "on task" with state and/or federal requirements. In the absence of a steady state presence, USEPA tends to step into the breach as problems appear. In direct policy level dealings between USEPA and a local program, it is particularly easy for the local program to drift into conflict with USEPA over federal Clean Air Act requirements - just as the current Clark County agencies have done. Technical assistance is important because few local agencies can maintain the complete range of technical expertise needed to deal with all federal requirements, particularly expertise that is needed infrequently. An exception to the general concern over lack of State/local agency coordination is the I/M program which requires the State to identify the test stringency and other program elements of the smog check program in a manner that carefully incorporates local agency and DMV input.

Recommendation

ENVIRON recommends that the role of the State be expanded to provide increased oversight and technical assistance to the recommended new Clark County air agency. ENVIRON does not believe that structural changes are necessary. The Division of Environmental Protection (DEP) and its Bureau of Air Quality appear to have fairly broad authority under existing law. But that authority has been used so sparingly that the DEP has not had an important influence on air programs in Clark County. ENVIRON believes that with a modest increase in effort the DEP can do much more than it has done historically to make the Clark County program more effective.

Though it is not an air agency as such, the Department of Motor Vehicles and Public Safety (DMV) has had more of an impact on air quality than the DEP because it implements and enforces vehicle I/M programs in Clark County. With closer coordination between the DEP and DMV on the one hand, and among these two state agencies and a single, countywide agency for air pollution control in Clark County on the other, ENVIRON believes that the DMV contribution to Clark County air quality can also be enhanced.

Finally, the Nevada Department of Agriculture currently has an important role in air pollution management, through their leadership in the Fuels Program and other key activities. As with the DMV, ENVIRON believes this agency should continue to work closely with air quality programs and play an important supportive role with the new agency.

Discussion

ENVIRON recommends that the DEP play a bigger role in the development, review and approval of SIP revisions. The DEP should monitor the timetable for major federal Clean Air

Act requirements and the progress Clark County has made to comply, and call on Clark County to initiate SIP revisions and/or necessary rule making when the local agency begins to lag behind. The DEP should be a party to SIP development to the extent that state-run control measures are part of the SIP control strategy. The State should concur in proposed revisions to programs it implements. Finally, the DEP should comment on draft SIP revisions and testify before the local governing board during the adoption process.

Based on our interview with state officials, the DEP and Bureau of Air Quality probably have the capability to provide needed SIP oversight now, though some augmentation of staff may be needed. The Environmental Commission can serve as the formal decision making body by acting on staff reviews and recommendations. This will establish political accountability at the state level. The Environmental Commission should formally approve SIP revisions on their way to USEPA. In the event of an unresolved issue, especially one that the DEP believes could cause the SIP to be disapproved by USEPA, the Environmental Commission should have the authority to remand the plan to Clark County for revision.

Given the tradition of local control in Nevada, which appears to be particularly strong in Clark County, ENVIRON does not recommend that the DEP take on the very strong oversight powers that state air agencies have in some states. In our judgement it is premature, for example, for the DEP to have the authority to take over and administer local program functions. If Nevada modifies the Clark County program along the lines recommended above, and the DEP assumes a more active role in monitoring local activities and approving SIP revisions, ENVIRON thinks that there will be sufficient accountability.

The DEP currently can provide limited technical assistance in selected areas. With the assistance of the DMV, the DEP can be particularly helpful in the area of mobile source emissions and control. By working with the DMV and Nevada DOT at the state level, the DEP can provide important information for the mobile source emissions inventory of both Clark (and Washoe) Counties. DEP's other areas of expertise include air monitoring and permitting. ENVIRON does not suggest that the DEP take over these functions, but they may be able to assist Clark (and Washoe) Counties to improve their programs by conducting monitoring station audits and permit program reviews.

ENVIRON also recommends that the DEP and the DMV continue to work together on Nevada's vehicle I/M programs. The State should be held accountable for the emission reduction goal set in the SIP for the several inspection programs. The DEP should take the lead for monitoring program effectiveness and initiating changes when they are necessary to achieve SIP goals. The DMV can continue to administer and enforce the programs as designed. The DEP should make fine-tuning adjustments to program, for example changes to pass/fail cut points, but should also take the lead in recommending fundamental changes to the Legislature when necessary to update SIP goals. The DMV should support the DEP by providing the data and information, commenting on proposed SIP revisions affecting I/M, and by suggesting design changes based on its experience.

ENVIRON believes that the changes described above can be made without any structural changes at the State level, but they will require a change in tradition and culture. The DEP has not been aggressive in pressing its point of view and seems to feel that it lacks the political "marching orders" to do so. Though major statutory revisions do not appear essential,

ENVIRON recommends that the Legislature consider making the DEP's oversight responsibilities explicit under the law.

Recent developments by the Clark County and Southern Nevada Cities task force to develop a single agency plan appear to provide several useful options for a greater State role. To develop an effective State-Local government air quality partnership, a four-part strategy has been tentatively identified. It includes the following elements:

- A biennial program audit by the NDEP of Clark County's air quality programs, conducted by an independent contractor.
- Creation of an "Air Quality Forum," similar to the existing Lake Mead Water Quality Forum that coordinates research efforts and shares environmental data.
- Participation by NDEP in the SIP development and implementation process.
- Membership by appropriate state agencies on the various advisory committees of the new agency.

The first two of these elements are certainly new and innovative, and could go a long way toward resolving some of the concerns about lack of State involvement that ENVIRON identified in its draft report.

For such a role by NDEP to become successful, however, there needs to be increased funding and staff available for the Clark County oversight activities described above. NDEP has roughly estimated that it would require three additional professional staff, contract funds of approximately $300,000 for the audit in the first year (FY02), and other miscellaneous direct and indirect costs. Total cost would be $577,000 in FY02 and $260,000 in FY03. Of course, every other year would have an extra addition of contract funds for the biennial audit.

The most significant legislative change would be the modification of NRS 445B.235 to direct the NDEP to conduct air quality programs in counties with populations over 400,000. There may be a need to modify legislation to establish adequacy criteria for the audits.

In summary, these suggested changes in the State role in Clark County air pollution control programs would satisfy many of the concerns identified in Recommendation 4. Critical to this effort, however, would be the identification of a permanent funding process for conducting the audits and participating in the air quality forum. Unless the state salary structure is made more competitive, State agencies such as the NDEP will continue to have staff turnover problems and difficulty in recruiting new staff for this increased role.

RELATIONS WITH FEDERAL AGENCIES

Introduction

There are three key federal agencies that impact air quality planning and implementation in Clark County. The most important is, of course, the USEPA. The Department of Interior's Bureau of Land Management (BLM) plays less of a planning role but a much more important role in implementing the dust regulations in the PM_{10} SIP. Finally, the US DOT provides major funding for transportation projects, makes the final decisions on air quality conformity findings, and would be subject to having its funding sanctioned if adequate plans and conformity findings cannot be made in Las Vegas.

The relationship between Clark County and the USEPA, primarily with the San Francisco Regional Office (Region 9), has had a mixed review over the years. When USEPA was established, the air pollution program had just been inaugurated as part of the CCHD and the new Clean Air Act gave both funding and regulatory powers to the new agency in Las Vegas. During the early 1970s, support in developing strong local air pollution control agencies was a high priority at USEPA and Clark County program received generally high marks from the Agency. Stationary sources were the key focus, though Clark County was one of the areas initially targeted by environmental groups for litigation requiring transportation control plans. This went away with the 1977 CAA revisions as they limited the requirement for mandatory transportation control measures and eliminated the federal mandate for indirect source regulation. Furthermore, the NAAQS for one-hour ozone was revised with a lower margin of safety that resulted in a standard of 0.12 ppm versus the previous 0.08 ppm. With these changes, and continued turnover of the motor vehicle fleet to lower exhaust emissions, Clark County attained the NAAQS for ozone in the early 1980s. Attaining the standard for CO was much more difficult, however, both due to the particular meteorological conditions at the monitoring site recording the highest levels of CO and the rapid growth of motor vehicles and population in the past twenty years.

Several interviewees noted, and USEPA staff concurred, that the Clark County air program did not received adequate attention by Region 9 during the 1980s. This was partly the result of extensive litigation in California and Arizona that required maximum use of USEPA resources. In 1992 and again in 1995 the USEPA conducted a program evaluation and issued a corrective action plan for the Clark County air program. This caused considerable interest and debate at the time, and led to some positive changes in the local air program but it did not result in any major USEPA intervention. In 1997, EPA visited the CCHD to review permits, enforcement, and inspection programs that were of concern in the 1995 program review, and closed out the audits after agreeing that most of the corrective actions had been taken by the CCHD.

During the 1990s, Nevada submitted three PM_{10} SIPs and two CO SIPs to USEPA. However, by 1998 the Clark County air issues became very apparent to local citizens as well as the Region 9 office of the USEPA. Las Vegas became an USEPA priority as air quality levels resulted in "bumping" up the CO classification to serious and USEPA's announced intention to disapprove the PM_{10} SIP. Many stakeholders in our interviews noted that Clark County now had the attention of USEPA and were very concerned over possible imposition of sanctions and possibly a Federal Implementation Plan. USEPA managers and staff now meet

on a monthly basis with Clark County (and the State) to discuss progress in correcting the attainment plans.

The BLM manages over 50,000 acres of land in the Las Vegas Valley and the recently adopted PM_{10} dust control regulations will affect much of that land. Estimates for the BLM to meet the new regulations range up to $27 million. The agency may elect to expedite sale much of that land, or may need to consider ways to obtain the necessary funding to implement dust controls on the remaining acreage. Recent examination of sources of potential funding for BLM identified possible amendment of the Federal Southern Nevada Public Land Management Act of 1998 to allow a portion of the revenue from BLM land sales in the urban Clark County area to be allocated to local air quality agencies to offset dust control programs. As that property is developed, it potentially creates dust problems in the urban area. This approach of tapping into the 1998 Act would be very controversial, however.

Under various Executive Orders, all federal agencies are required to abide by state and local regulations that protect the environment. Executive Order 12088 (10/13/78, 43 FR 47707) and the much more recent Executive Order (EO) 13148 (4/21/00) which partially supercedes E.O. 12088, apply more precisely to environmental responsibilities of Federal agencies.

Issues related to the USDOT are discussed elsewhere in this report.

Recommendation

Clark County and the State of Nevada should take steps to assure that regular meetings with Region 9 USEPA continue to occur, even after the current plan approval crisis is resolved. They should be proactive with USEPA to minimize policy disagreements, solicit timely comments and action on SIP submittals, and obtain technical assistance when needed. The establishment of a Federal/State Liaison Officer as the focal point in the proposed new organization (See Recommendation 2) with USEPA is very important.

The USEPA should begin to work much closer with BLM officials to assure that they address the various State and Clark County regulations contained in the various SIPs. The Environmental Impact Statements (EIS) that will need to be developed by BLM for its various land sales must clearly identify the air quality impacts for development of the potential sales.

Discussion

The team's review of effective local and regional programs across the country found that the most successful of these had good relations with the USEPA. This does not mean that they routinely agreed to every policy or regulatory decision made by USEPA, but they were not "surprised" by the action and felt comfortable discussing their concerns openly with the Agency.

This recommendation, in tandem with the earlier recommendations on improving the organizational and technical aspects of the Clark County air programs, should compliment an effort already underway between USEPA, DOT, and the various State and local air/transportation planning agencies. While closer liaison with USEPA does not necessarily change the way that USEPA does business or its role in the SIP, it should help their awareness

and understanding of local air quality issues and perhaps lead to more equitable resources for the new agency. The proposed creation of an Air Quality Forum, led by the NDEP as described in the discussion section of the previous recommendation, would include representation from the USEPA-Region 9 office. Additionally, it is proposed that the BLM be represented on the Technical Advisory Committee to the new Board. Since the release of the draft report by ENVIRON, the USEPA-Region 9 air staff have began a series of meetings with BLM staff in Nevada to discuss the implementation of the new dust controls.

PUBLIC OUTREACH AND EDUCATION PROGRAMS

Introduction

A perception was gained from the various interviews with members of the general public that a less than adequate effort was made in the past to involve them in the SIP development process. The general public is both a primary and secondary source of air pollution. The public drives vehicles, build homes, and use lawn equipment that releases emissions into the air. The public also uses products such as gasoline, heat, electricity and consumer goods whose production causes air pollution. Therefore, the public is an important key to emission reductions. In addition, the public can be an extremely valuable source of ideas for pollution reduction as well as an organizer of local or neighborhood emission programs such as carpools.

Recommendation

The new air agency needs to move quickly to develop public outreach and education programs. These should include, at a minimum, speakers and demonstrations in neighborhoods, schools, public forums, fairs, and other public events. The USEPA has recently developed an enormous amount of material in the form of brochures, videos and other public outreach materials that may be helpful in this effort. More emphasis on web sites, making air quality data available in real-time as well as including the ability to create time series graphs of air quality; news and radio emphasis on air quality issues and air quality indices would all be helpful additions to current efforts. Citizen Advisory Groups either on source types (stationary sources, motor vehicles) or planning efforts (particulate matter, ozone, etc) should be convened regularly and their input addressed.

Discussion

Vigorous public involvement and participation in local planning efforts is a good sign of an effective program. Efforts to make air quality programs more open and active and responsive to public input will play an important role in increasing the effectiveness of Clark County air programs.

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APPENDIX A

Master Interview Listing for the SB 432 Study

Master Interview Listing for the SB 432 Study

Affiliation	Interviewee	Phone Number
Government		
City of Henderson	Susan Gray, Principal Planner	(702) 565-2474
City of Las Vegas	Lori Wohletz	(702) 229-2338
City of North Las Vegas	Leslie Long	(702) 633-1259
Clark County Board of Commissioners	Bruce Woodbury	(702) 455-3510
Clark County Health District, Air Quality Div.	Art Bashor	(702) 383-1276
Clark County Health District, AQD	Femi Durosonmi	(702) 383-1276
Clark County Health District, AQD	Elizabeth Gilmartin, NSR Supervisor	(702) 383-1276
Clark County Health District, AQD	Mason McNinch, Compliance Supervisor	(702) 383-1276
Clark County Health District, AQD	Cynthia Mikes, Senior Administrative Clerk, Enforcement Projects Section	(702) 383-1276
Clark County Health District	Dr. Donald S. Kwalick, Chief Health Officer; Michael Naylor, Air Pollution Control Officer, AQD; and Michael Sword, Assistant APCO	Kwalick (702) 383-1201 Naylor (702) 383-1276
Clark County, Manager's Office	Richard Holmes, Assistant County Manager	(702) 455-3530
Clark County Dept. of Comprehensive Planning	Russell Roberts, Planning Manager; Clete Kus, Principal Planner; Will Cates, Principal Planner; Rick Matei Modeler	(702) 455-4181
Clark County Dept. of Comprehensive Planning, Advanced Planning Division	Phil Rosenquist, Assistant Director	(702) 455-4181
Federal Highway Administration, Nevada Division Office	Randy Bellard, Planning & Research Engineer	(775) 687-5332
Federal Highway Administration, San Francisco Office	Robert O'Loughlin, Regional Air Quality Programs Manager	(415) 744-3823
McCarran International Airport	Dennis Mewshaw, Airport Planning Manager	(702) 261-5072
Nevada Department of Motor Vehicles and Public Safety, Motor Vehicle Branch	Jim Parsons (Program Manager), Peter Bellis (Staff II, Mechanical Engineer), Russ Benzler (Administrator Compliance Enforcement Division	Parsons (775) 684-4782 Bellis (775) 684-4682 Benzler (775) 684-4790

Affiliation	Interviewee	Phone Number
Government, continued		
Nevada Division of Environmental Protection	Allen Biaggi, Administrator; Jolaine Johnson, Deputy Administrator, Colleen Cripps, Air Quality Bureau Chief	(775) 687-4670 Biaggi: x-3021; Johnson: x-3075 Cripps: x-3065
Nevada Department of Transportation	Tom Stephens, Director; Kent Cooper, Program Development Manager; Marc Reisman, Transportation Analysis (LV office); Jeffrey Fontaine, Deputy Director; and Daryl James, Chief of Environmental Services Division	(775) 888-7400
Nevada Department of Transportation	Marc Reisman, Transportation Analyst	(702) 676-1565
Regional Transportation Commission	Jerry Duke and Justin Schor	(702) 676-1602
U.S. EPA, Region 9, Air Division	David Howekamp, Air Division Director , Ken Bigos, Associate Director Julia Barrow, Planning Office Chief, Larry Biland, NV Planning Liaison, John Kennedy, Technical Support Office Chief, Karina O'Connor, NV conformity contact , Scott Bohning, EPA modeler, Ed Snyder, Teams Development Specialist, Roxanne Johnson, NV mobile Source Liaison, Steve Branoff, Permits Office, Karen Irwin, Rulemaking Office, Roy Ford, Program Grants Officer for Nevada & Hawaii, Grants & Program Integration Office; Jack Colbourn, Chief, G&PI Office; and Duane James, Chief, Enforcement Office	Howekamp (415) 744-1219 Bigos (415) 744-1240 Barrow (415) 744-1230 Biland (415) 744-1227 Kennedy (415) 744-1294 O'Connor (415) 744-1247 Bohning (415) 744-1293 Snyder (415) 744-1154 Johnson (415) 744-1225 Branoff (415) 744-1290 Irwin (415) 744-1903 Ford (415) 744-1233 Colbourn (415) 744-1239 James (415) 744-1138

Affiliation	Interviewee	Phone Number
Business		
Alliance of Automobile Manufacturers (AAM)	Steven Douglas	(916) 498-3341
Kiewit Western Co. & Member of APCD District Hearing Board	Dennis Davis, Area Manager	(702) 798-0616
Chamber of Commerce, Las Vegas	Pat Shalmy, Exe. Director	(702) 735-2450
Desert Research Institute	John Watson	(775)-673-7300
Howard Hughes Corporation	Jeffrey Rhoads	(702) 791-4428
The Lubbers Law Group	Edward C. Lubbers	(702) 257-7575
Nevada Resort Association	Richard Bunker, Executive Director	(702) 735 4888
Nevada Contractors Association	Berlyn Miller, Consultant	(702) 251-5648
Nevada Motor Transport Association	Daryl E. Capurro, Managing Director	(775) 631-6111
Southern Nevada Home Builders Association	Terri Barber, Deputy Director	(702) 794-2439
Strategic Solutions	Terry Murphy	(702) 889-2840
Western States Petroleum Association (WSPA)	Gina Grey	(916) 498-7754
Public		
Citizen Alert	Jessica Hodge	(702) 796-5662
Nevada Environmental Coalition	Bob Hall	(702) 360-3118
Jeweler (and concerned citizen)	Joseph Lenoir	(702) 431-1375

APPENDIX B

Letter from Senator Porter Requesting Interview and Interview Guide Letter

Nevada Legislature

SENATE

February 9, 2000

Dr. Donald S. Kwalick
Chief Health Officer
Clark County District Health Center
625 Shadow Lane
Las Vegas, NV 89106

Dear Dr. Kwalick:

I am writing to request your cooperation and participation in an important legislative study of air quality in Clark County. With the enactment of Senate Bill 432 (Chapter 529, *Statutes Of Nevada 1999),* the 1999 Nevada Legislature directed the Legislative Commission to appoint a subcommittee of legislators to carry out an interim study of the programs for air quality control in Clark County. I serve as chairman of this subcommittee, the Legislative Commission's Subcommittee on Air Quality Programs in Clark County (S.B. 432 Subcommittee).

As part of its responsibilities, the subcommittee is directed to contract with a qualified, independent consultant to conduct a study of air quality in Clark County. Among other topics, the consultant's study must include an analysis of and recommendations concerning the following:

- Existing programs related to air quality in the county and methods for improving the efficiency of these programs;

- Programs that may be required in the future to meet air quality standards; Current and future funding requirements of air quality programs; and

- The roles of state and local governmental agencies and the private sector in addressing air quality issues in Clark County.

Senate Bill 432 requires the consultant to submit a written report to the subcommittee on or before June 30, 2000, and it also requires the subcommittee to review the report on or before October 15, 2000. Further, the bill requires the Legislative Commission to submit a report of the subcommittee's findings and recommendations to the 2001 Legislature.

The subcommittee has selected and contracted with ENVIRON International Corporation to carry out the study mandated in S.B. 432. I strongly encourage your cooperation with ENVIRON team members as they interview key players and accumulate the necessary background materials to make their recommendations. Because these recommendations must be made no later than June 30, 2000, your timely participation is requested. You will shortly be contacted by ENVIRON to schedule an interview either by telephone or, in some cases, face-to-face. The key areas on which we would like to focus this discussion are attached, as well as a request for any relevant, recent (last few years) reports that you may have generated. ENVIRON will strive to keep the interview as succinct as possible, though some interviews of key stakeholders may require additional time to acquire the broad base of information that you may possess. You are welcome to have appropriate staff participate in the interview session.

Mr. David Souten, a principal of ENVIRON, will have overall responsibility for this project. Project team members that carry out the interview process include Mr. David Calkins, Ms. Barbara Joy, Mr. Jim Lyons, and Mr. William Sylte.

I am sure you will find this process an opportunity to make an important contribution to addressing the future air quality programs of the Las Vegas Valley. ENVIRON has pledged to be fully objective, unbiased, and confidential (where such confidentiality is requested) in this effort. Their purpose is to gather the facts and make recommendations to the subcommittee based on their professional judgment and extensive experience in air pollution programs. Their findings are not intended to secure consensus or continue the status quo. Action on the recommendations of the ENVIRON team, whether to seek changes or consensus, is the responsibility of our subcommittee and, ultimately, the Nevada Legislature.

I appreciate your cooperation and thank you for your continued efforts to preserve and improve our environment.

Sincerely,

Jon C. Porter
Chairman, S.B. 432 Subcommittee

JCP/dow/mk:Air Quality-LI9

ENVIRON

15 February 2000

Dr. Donald S. Kwalick
Chief Health Officer
Clark County District Health Center
625 Shadow Lane
Las Vegas, NV 89106

Dear Dr. Kwalick,

As the Honorable Senator Porter has noted, ENVIRON is beginning the S.B. 432 study and you have been identified as an important stakeholder in the data-gathering phase for implementing S.B. 432. A member of the ENVIRON Team will be contacting you shortly to arrange a time to personally meet with you, and any members of your staff or organization that you feel it would be beneficial to participate in the interview.

The areas that we would like to focus the discussion upon are as follows:

Technical Areas:

- Adequacy of current procedures for assessing air quality (air monitoring, emission inventories, tracking programs, etc.)
- Information on the air quality monitoring network in Clark County and future plans for that network
- Current stationary, area, and mobile source emissions inventory and forecasting practices for- Clark County
- Current control measures and programs for stationary, area, and mobile sources in Clark County
- Success in implementing these existing air quality programs and measures
- Suggestions for reducing vehicle use, both frequency and vehicle miles traveled (VMT)
- Data and adequacy of forecast for population, economic conditions, VMT growth, and transportation needs
- Ideas/Recommendations for future control measures for all source types

Institutional Areas:

- Changes to the institutional structure that would improve air quality programs.
- Increasing the role of the State agencies or Legislature in Clark County air programs.
- Potential legislative "fixes" to the current problems

- Technical competence of local and regional agencies that have air pollution control and planning responsibilities
- Role of air quality considerations in the ongoing transportation programs of Clark County. Conformity issues.
- Adequacy of coordination between air quality and transportation/land use agencies, past experience and future potential
- Reasonableness of timeframe to develop and implement the air quality control measures
- Potential barriers to implementation of the air quality control program

Financial Considerations:

- Current funding mechanisms for air pollution and transportation programs.
- Need for greater public contribution to air quality program revenues.
- Suggestions for new revenue sources and willingness to pay.
- Cost effectiveness of existing and suggested control measures.
- Cost of various air pollution control programs

Attitudes and Perceptions:

- Attitudes toward transportation/mobile source control strategies versus more stationary source controls
- Air quality and transportation controls as political issues
- Industry attitudes toward air quality.
- Public acceptance of ridesharing, transit, and other transportation measures
- Public perception of the air pollution problem in Clark County
- Adverse (and supportive) attitudes towards pricing, parking limitations, and other land use controls as potential air quality measures
- Actual or perceived impact on labor relations

Other, General Areas for Discussion:

- Air quality - SIP history, trends, role of stationary versus mobile sources, modeling, public involvement, etc.
- Growth issues and their impact on air pollution in Clark County
- Background information on characteristics of land use, employment trends, general economy, political structures, and governmental organizations
- Characteristics of transit system, travel patterns, trends in VMT

We believe that the above list encompasses the major areas that we are expected to consider in developing recommendations to the S.B. 432 Subcommittee. Not all topics, of course, will be covered in each interview. However, we will be glad to discuss additional areas that you feel would also be relevant to our information gathering process. In addition, we may need to conduct a follow-up telephone interview after reviewing the data you've provided and to discuss questions that have come up after the interview.

We look forward to our meeting with you and obtaining your important insights on ways to improve the technical, regulatory, and institutional approaches to reducing air pollution in Clark County.

Sincerely,

David R. Souten
Project Manager

cc: M. Naylor

APPENDIX C

Listing of Non-Nevada Agencies Interviewed

SB 432 - List of Non-Nevada Agencies Interviewed

Puget Sound (Washington) Clean Air Agency
Dennis McLerran, Executive Director
Interviewed: McLerran, Dave Kircher (Manager, Engineering Department) and Jim Nolan (Director, Compliance Division)
Dennism@pscleanair.org
(206) 343-8800

Dayton Regional Air Pollution Control Agency
John Paul, Supervisor
Interviewed Bruno Maier (Assistant to the Director)
Paulja@rapca.org
(937) 225-4435

Environmental Protection Commission of Hillsborough County, Florida
Jerry Campbell
Dropped from list. Campbell and other senior managers were not available during the period in which the interview needed to be conducted.
Campbell@epcjanus.epchc.org
(813) 272-5530

Colorado Regional Air Quality Council (Denver)
Ken Lloyd, Executive Director
Interviewed Lloyd
Staff@raqc.org
(303) 629-5450

Ventura County (California) Air Pollution Control District
Dick Baldwin, Air Pollution Control Officer
Interviewed Baldwin
Db@vcapcd.org
(805) 645-1440

APPENDIX D

Listing of Studies for Review for LCB SB 432 Project

Listing Of Studies For Review For LCB SB 432 Project
Updated September 27, 2000

Study Date	Author/Title	Project Library Ref. #
2000	CCDCP. Modeling Protocol - PM_{10} State Implementation Plan (SIP) Revision for the Las Vegas Valley Non-Attainment Area. February 10, 2000.	52
2000	CCHD. Presentation. "Recent Air Quality Activities Update from Clark County Health District Air Quality Division. Feb. 14, 2000	49
2000	Dames & Moore. Final Report. "Silt Loading Measurements for Clark County Paved Roads". Submitted to Clark County Regional Transportation Commission. March 16, 2000.	70
2000	Dames & Moore. Draft. "PM_{10} Emission Inventory of Sources Surrounding Five Ambient Monitoring Sites in the Las Vegas Valley". Submitted to Clark County Dept. of Comprehensive Planning.	69
2000	Dept. Of Conservation and Natural Resources. DEP. State of Nevada. Memorandum to Governor Kenny Guinn. From Jolaine Johnson. Subject: Summary of Clark County/Nevada/EPA Meeting regarding Clark County Air Quality, Feb. 17-18, 2000.	48
2000	FHWA. "Regional Transportation Commission - 2000-2002 TIP Financial Overview"	82
2000	Ricondo & Assoc. Final Report. "PM_{10} Emissions Inventory-McCarran International Airport, North Las Vegas Airport, and Henderson Executive Airport". Submitted to the Clark County Dept. of Aviation. February 2000.	65
2000	Robert W. Hall, M.S.NEC Report on Clark County's District Board of Health Revision 3. March 20, 2000	80
2000	LCB. Tapes from February 14, 2000 meeting at LCB.	61
2000	LCB- Miscellaneous Exhibits from LCB SB432 Hearing. February 14, 2000.	62a-s
2000	Dr. John Watson. "Southern Nevada Air Quality Study (SNAQS)". January 12, 2000.	81
1999	Bureau of Air Quality. "State of Nevada Bureau of Air Quality-Ambient Air Quality Trends - 1988-1998".	71
1999	Clark County - September 29, 1999 CO SIP submittal to EPA Region 9	58a &b
1999	CCDCP. 1999. "Carbon Monoxide Air Quality Implementation Plan, Las Vegas Valley Non-attainment Area, Clark County, Nevada. September 1999.	56
1999	CCDCP. 1999. "Carbon Monoxide Air Quality Implementation Plan - Appendices A-D, Las Vegas Valley Non-attainment Area, Clark County, Nevada. August 1999.	57
1999	CCDCP. Draft. "Evaluation of Impacts of T2AT on Las Vegas CO SIP. March 11, 1999	50
1999a	CCHD. 1999a. "Air Monitoring Network 1998 - 1999 NAMS/SLAMS Network Review Report, EPA Progress Report on Workplan for FY99, page 9 Referencing Ambient Air Monitoring". July.	72
1999b	CCHD. 1999b. "Air Quality Issues in the Las Vegas Valley". Presentation by Michael Naylor of CCHD.	73
1999	CCHD. Presentation by Michael Naylor. "Air Quality Issues in the Las Vegas Valley".	44
1999	CCHD. "Independent Accountant's Report". Air Pollution Control District.	46
1999	Chow, J.C et al. Technical Paper. "Middle- and Neighborhood-Scale Variations of PM_{10} Source Contributions in Las Vegas, Nevada. *Journal*	51

Study Date	Author/Title	Project Library Ref. #
	or AWMA-Volume 49. June 1999	
1999	Chow, J.C et al. Technical Paper. "Long-Term Efficiencies of Dust Suppressants to Reduce PM_{10} Emissions from Unpaved Roads. *Journal or AWMA*-Volume 49. June 1999	66
1999	Dames & Moore. "Fugitive Dust Mitigation Strategies for Clark County Dept. of Aviation- Las Vegas, NV". Report No. 41371-001-131. June 1, 1999. Prepared by Dames & Moore, Inc., Santa Ana, CA.	64
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APPENDIX E

Written Comment Submittals

Written Comment Submittals

Michael Naylor/Clark County Health District
Femi Durosonmi/Clark County Health District, Air Quality Department
Elizabeth Gilmartin/Clark County Health District, Air Quality Department
John Schlegel/Clark County Department of Comprehensive Planning
Russell Roberts/Clark County Department of Comprehensive Planning
Dennis Mewshaw/McCarran International Airport, Department of Aviation
Colleen Cripps/Nevada Division of Environmental Protection
Jerry Duke/Regional Transportation Commission
Jacob Snow/Regional Transportation Commission
Margaret Pierce/Southern Nevada Group of the Sierra Club
Edward Hoganson/State of Nevada, Department of Agriculture,
Division of Measurement Standards
Jason Geddes/State of Nevada, Department of Agriculture
Tom Stephens/State of Nevada Department of Transportation, Director's Office

APPENDIX F

Formal Comments Received

June 13, 2000

David Souten
ENVIRON International Corporation
101 Rowland Way, Suite 220
Novato, CA 94945

Mr. Souten,

Please accept the following comments from the Nevada Department of Agriculture pertaining to your draft reports concerning SB-432 and the Study of Air Quality Programs in Clark County.

The Nevada Department of Agriculture Fuels Program serves to ensure that all consumers in Nevada have quality fuel while maintaining or improving current levels of air quality. The State Board of Agriculture is directed by NRS 590.070 to "adopt regulations relating to the standards for fuel, ..., which are substantially similar to the laws and regulations of the State of California relating to those standards." The Program makes every effort to coordinate Nevada fuel standards policies between all federal, state and local authorities and will standardize fuel regulations, as much as possible, between states. The Program also has the lone State of Nevada voting member of the American Society for Testing and Materials (ASTM) that establishes national fuel standards.

Once standards are set for the State of Nevada, the Program has the duty, through the Board of Agriculture and NRS 590.071 "to enforce the standards relating to the quality of fuel." This includes sampling the fuel from all public fuel dispensers in the state and analyzing them at one of the state petroleum laboratories. The fuel samples are tested to meet all of the fuel standards that have been established by the Board as defined in NAC 590, which include fuels specific to Clark County. In addition, there are written agreements between the Clark County Health Department and the Department of Agriculture to perform fuels analysis and fuels screening.

The Department of Agriculture Fuels Program was added into the Pollution Control Account in NRS 445B.830 by SB-511 in the last legislative session. The Department is to receive funding from the pollution control account "to carry out the provisions of NRS 590.010 to 590.150, inclusive." The Department was added to this section as the importance of fuel testing and meeting fuel standards was recognized as a vital function in achieving better air quality.

In addition, the Program has established and chairs the Fuel Standards Environmental Coordination Committee (FSECC). The FSECC was established to meet and coordinate with the Nevada Division of Environmental Protection(NDEP) to provide input into evolving environmental regulations and to provide a forum to enhance and facilitate communications between air quality agencies and affected industries served by the Department. This committee meets on a quarterly basis and includes members of NDEP, DMV-PS, NDOT, CCHD, CCCPD, State Energy Office, Washoe County Health Department, Nevada Highway Patrol, Nevada Divsion of Minerals and private sector representatives form the Nevada Propane Dealers Association, A-55 Clean Fuels, Western Energetix, and the Nevada Motor Transport Association. The Fuels Program Coordinator is also a member of Las Vegas Clean Cities Coalition, Truckee Meadows Clean Cities Coalition, and the Air and Waste Management Association and plays an active role in the betterment of air quality in Clark County and throughout the state.

The Nevada Department of Agriculture and its Fuels Program was absent from your draft reports and it should be included as it serves an important role in improving air quality in Clark County. The Department of Agriculture must be included in any recommendations concerning state involvement in the development of new programs and standards in Clark County. Since the responsibility of creating new fuel standards, such as the lowering of summertime RVP, is the duty of the Board of Agriculture, it must be included in any discussion or implementation of new fuel standards. Monitoring and enforcement of the new standards will also fall under the purview of the Department and it must be included in those sections.

Specifically, in Task 4: Governmental Roles and Responsibilities for Air Quality Programs in Clark County, recommendation 1 should include reference to the Department of Agriculture as a state agency actively involved in air pollution for possible inclusion as the Governor's appointment to the committee. The recommendation under the role of state agencies should include reference to the Department of Agriculture as a relevant State agency. The legislative "laundry list" includes several items that will have to be approved by the Board of Agriculture or enforced by the Department of Agriculture and the Department needs to be included in this process.

Please add comments to the report concerning the role of the Department of Agriculture and include that we are interested and obligated to play a greater role in working with the new single agency to improve air quality in Clark County.

Respectively,

Edward M. Hoganson, Administrator
Division of Measurement Standards
Bureau of Petroleum Technology

Jason Geddes, Ph.D.
Acting Fuels Program Coordinator

c. Legislative Counsel Bureau

May 19, 2000

Mr. Dave Souten
ENVIRON
Golden Gate Plaza
101 Rowland Way
Novato, CA 94945-5010

Dear Dave,

Thanks for sending us the Draft Report for Task 1: Assessment of Current and Future Air Quality in Clark County, Nevada.

Environ is to be commended for covering a lot a material in a short timeframe.

We have a number of specific comments. We appreciate your extending the time for submitting comments.

First, several of us in management (Dr Kwalick, Mike Sword and myself) are disappointed that we were not interviewed about most topics covered.

Some information is presented with a spin which is not only unflattering but overlooks several important facts and distinctions. For example, EPA's guidance document on top-down, BACT Analysis and the guidance document on emission factors commonly referred to as AP-42. Section 7, Assessment of Local Control Program, seems to infer that every facility must undergo a top-down BACT determination by this agency. However, the top-down BACT guidance document itself specifies the requirements only apply to major sources or major modifications in the Prevention of Significant Deterioration (PSD) area. On the EPA website is a memo from John Calcagni, Director of the Air Quality Management Division, dated June 13, 1989, which identifies the intent and background relative to the top-down BACT guidance document. On page 5 of same memo, the last paragraph states *"In theory, these statutory goals can be fulfilled by either a top-down or a bottom-up approach to BACT determinations."* While EPA does prefer the top-down approach, they do acknowledge in their intent documents that other approaches can achieve the appropriate statutory requirements. One other EPA memo of interest is from John S. Seitz, Director of the Office of Air Quality Planning and Standards. The memo is undated and is also available on the EPA website. Second paragraph of same memo starts *"In broad overview, the initial responsibility for identifying candidate control options for considerations as BACT usually lies with the applicant, and the permitting authority may suggest certain additional options for consideration. The permitting authority independently reviews the applicant's proposal to assess its adequacy. Thus, ultimately, the permitting authority decides, on a case by case basis, what emissions limitations constitutes BACT.*

In addition, it should be noted that BACT can be established as a control device, a control limitation, an emissions limitation, etc. For facilities which the District sees a minimum of ten times per year, many templates regarding BACT have been developed. For example, with sand and gravel facilities, a control factor of 85% is required. The specific control technology to meet BACT is left up to the applicant. There are several controls which can meet this from water to bag houses, et cetera.

The most recent version of AP-42 is the fifth edition published in January of 1995. Page 4 of same document provides a chart which compares eight different emission estimate approaches to potential reliability of the estimate and the increasing cost to obtain emission factors. It is obvious to the most casual observer that emission factors from AP-42 vary considerably with the reliability of the estimate as compared to other methods including State or industry factors. In most cases, EPA would prefer that State or regulatory agencies develop their own unique and locally applicable emission factors. Part of the reason for this can be found on page 2 of the AP-42 document. The second paragraph under Uses of Emission Factors, the last two sentences state *"Because emission factors essentially represent an average of a range of emission rates, approximately half of the subject sources will have emission rates greater than emission factors and the other half will have emission rates less than the factor. As such, a permit limit using an AP-42 emission factor, would result in half of the sources being in non-compliance."*

The District has adopted the use of emission factors which are greater than those found in AP-42 for many of the common local operations. This minimizes the number of facilities which are found to be in non-compliance, is more conservative and far reaching than the Federal program and effectively enhances the nature of controls that are applied.

Many of the changes which have occurred in the last five years appear to be missing from the analysis. For example, in 1990, there were 23 staff members in the Air Pollution Control Division. In 1997, there were 35 staff members. In 1999, there were 67 staff members. There are currently plans to have as many as 100 staff within the next two years. Discussions of this nature have been presented to the Board of Health, the decision-making authority. In 1990, there were two supervisors and a director. By 1991, an enforcement supervisor was added. In 1996, a new source review supervisor was added. In 1998, a compliance supervisor and compliance section were added. In 1999, an additional new source review supervisor and an additional enforcement supervisor were added. Plans for the year 2000-2001 include the addition of two managers and one to three supervisors, depending on the level of approved staffing. Prior to 1998, the gasoline dispensing program was run completely by one individual. Today there are one permit writer and one fulltime inspector. Also, there are enforcement officers who are qualified to inspect gasoline dispensing facilities on rainy days or in spare time. In 1996, the NSR section was comprised of one supervisor and five permit specialists. By July of 1998, NSR consisted of one supervisor, one clerical person and seven permit writers. Today, there are two NSR sections. Each section contains a supervisor and clerical person. One NSR section has six permit writers. The

second NSR section has three permit writers. The same pattern holds true for many other staffing and program issues within the division. In this way, especially in the last five years, the division has made significant forward progress to improve various aspects of the program.

1) Introduction (page 1)

Environ discusses the popularity of the area and potential reasons why people move here. You should add the lack of a State personal income tax. Virtually everyone in the AQD moved here from out of state and we are not aware that the promise of clean air was a motivating factor.

We are understandably sensitive about the remark in the first paragraph that there appears to be a popular perception that the air problems are getting worse and no one is doing anything about it.

On the contrary, the public sees our agency at work all the time. Every construction site in the County has an informational sign that has our name and telephone number to report complaints. During the wintertime, all gasoline dispensing pumps carry labels showing that the gasoline is oxygenated. Labels also show our name and number for reporting vapor recovery problems with the hoses. Our success in 1999 with no CO exceedances was widely reported by the media as well as the fact that local gasoline contains only trace levels of MTBE.

The county is now advertising the phone number for reporting smoking vehicles.

2 2) Overview of Existing Air Pollution Control Programs

At the bottom of the page you should consider adding the alleviation of traffic congestion as a means of controlling mobile source emissions. The improvements recently completed at the Spaghetti Bowl have greatly reduced the stop and go conditions on the interstate and expressway.

3) Specific Control Programs for CO (pg 9)

We would appreciate your mentioning that the oxygenated gasoline program is at the maximum oxygen level allowed by federal regulations - 3.5%. This has been dubbed an ethanol mandate. Western States Petroleum Association sued the County Board of Commissioners and the Board of Health when the regulation was adopted. EPA has approved the regulation and a motion to dismiss is pending.

4) Ambient monitoring program (pg 13)

We appreciate Environ noting that our network is rather extensive for our population.

Environ notes that VOC (Volatile Organic Compounds) measurement is not a current part of the program. We have expanded the instruments for monitoring ozone and nitrogen oxides. The next phase is the measurement of VOC species. We will be working with the Department of Comprehensive Planning to design this system and it will incorporate variables that are need to the ozone modeling

5) Data Reporting procedures (page 16).
You suggest that certain data summaries do not conform to EPA procedures and you site the example of not seasonally weighting average PM concentrations. We are aware of this requirement for every sixth day sampling but question if it is meaningful for continuous sampling every day. Please clarify your statement.

You have acknowledged our website. The new address is www.cchd.org. This site does not yet provide archived data but that feature is in development.

Page 17

The District opened up a new station near Eastern north of US 95 to check for CO because we had the same concerns Environ did about the elevated, modeled CO concentrations in that area. This area is displayed in the Environ report at figure 2-6. Located about ¾ mile north of US 95, the site is known as JD Smith, and the site selection involved several EPA visits. It started operating in late 1998. During 1999, the Sunrise Acres station had a high 8-hour of 8.6 ppm compared to 6.1 ppm at JD Smith.

6) PM_{10} Monitoring Network (page 29)
You suggest that consideration should be given to locating a more representative background site. We agree, and this is a frustrating challenge. The Apex site clearly is not a background site given its presence in the proximity of several major PM_{10} sources and a dry lakebed with recreational vehicle use. The Jean monitor on some days is good for background if the winds are not coming from the dry lakebed there (which has been likewise disturbed by recreational vehicles). We have contracted with NDOT to operate a site in Searchlight and that may work out to be a good background site. It is difficult to overcome the fact that a potential desert site may have nearby disturbed surfaces.

7) Visibility monitoring (pg 31)
We have recently updated some trend data on the number of days per year with good and poor visibility. Charts are attached.

Using chemical speciation of PM_{10} measurements and chemical mass balance modeling techniques and the relative proportions of $PM_{2.5}$ and PM_{10}, we have estimated $PM_{2.5}$ levels for days with high haze in 1995. As shown on the attached pie chart, fuel combustion particles were calculated to contribute to approximately 58% of visibility impairment. This estimate will be refined by the ongoing DRI project.

With pass through funding from the DMV, via the District, to Clark County, DRI has been contracted to do both $PM_{2.5}$ speciation and real time visibility monitoring. A copy of the most recent progress report to DMV is being sent for your information. This will augment the speciation work that the AQD will be doing later this year.

8) Ozone status (page 35)

By the end of this summer we will know where the Valley stands with respect to attainment of the 8 hr standard. We expect that the 8 hr statistic will show non-attainment, based on measurements at the Palo Verde station.

9) Monitoring of Meteorological Parameters

We have asked the Dept of Comprehensive Planning to pass on to you an update of the activities underway by the Desert Research Institute

10) Stationary Point Source Inventories (page 50)

The amount of QA/QC performed on the inventory maintained by the District has varied significantly from year to year depending on the staff, individuals assigned and the amount of time they are able to work on same. For the years 1994, 1995 and 1996, only major source and some Title V sources were inventoried. By 1996, the inventory was limited to less than 100 sources. The 1994-1996 inventories were performed and maintained by the same individual staff person. Part of the individual's responsibility was to spot check the information reported by the facility as well as the information maintained in the database. For calendar year 1997, the Emissions Inventory effort was the very first effort attempting to inventory every facility permitted by the District: approximately 1,700 stationary sources. All data entered into the database was entered by Permit Specialists who had been instructed to review the entries for reasonableness. The calendar year 1998 Emissions Inventory was entered by one Permit Specialist, who carefully reviewed every entry for reasonableness but may not have verified those entries within the computer databases. In addition, this same individual went through each major source with significant detail looking for appropriateness of emission factors, the sensitivity of the results to the emission factors, consistency in throughput reporting, (comparing throughputs reported to the District against records observed by the District's Level II facility inspector), checking emission and throughput estimates as compared to previous years and also compared to permitting limits and requirements. Also, related to 1998 emissions, most of the drycleaners and gasoline dispensing facilities were entered by clerical staff with minimal review. However, the database records were compared for each facility to prior years reported by same for the purpose of identifying significant deviations and growth patterns. The calendar year 1999 Emissions Inventory is still in process. All information is reviewed and entered by one individual.

11) Local Stationary Source Regulations (page 110)

We believe our regulations have several more provisions than you cite that exceed minimum federal requirements.

a. In recent years, the Air Quality Division has focused attention on updating Section 12 of the rules for new source review and prevention of significant deterioration.

b. We have advanced the BACT thresholds in a number of areas and require BACT for all minor sources.

c. We require new and modified stationary sources to mitigate their emissions by acquiring emission reduction credits, if the PM_{10} emissions exceed 1 ton per year (2 tpy for CO, NOx, 5 tpy for VOC).

d. LAER is required for major VOC sources even though the Valley is attainment for ozone.

e. In the central core area of the valley new stationary sources cannot exceed 50 tons per year of NOx emissions.

f. Section 29 of the air pollution control regulations requires low sulfur diesel for all off-road use including diesel engines.

12) Although the vapor recovery rules for gasoline stations are not unusual, it is unusual to see them in an attainment area. The regulations were adopted in 1991 as an insurance plan to stay in attainment. There was no Federal requirement to adopt the regulations.

Environ suggests that we are ignoring our own Section 26 regarding zero opacity. This requirement refers to the design of a facility. The key word is "calculated." The same rule includes the phrase 20% for three minutes. It is quoted here:

26.1.2.5 Any existing source undergoing modification shall incorporate control devices and methods calculated, within the maximum control capability which is technically practicable at the time that the modification is begun, to eliminate all visible emission from the source involved.

26.1.2.6 Any new source shall incorporate control devices and methods calculated to produce zero (0) opacity, except for three (3) minutes in any sixty (60) minutes during which time a visible emission of 20% opacity shall be permitted.

You state that 26.1.2.7 relaxes the general opacity limit for certain chemical processes and that it contradicts state regulation. The State has a general rule, similar to ours, and industry specific rules that deviate from the general rule.[1]

In this particular rule, note that it applies to chemical processes for titanium, etc., built before 1981. There are no longer any emission units to which this applies since

[1] For example, certain older coal fired power plants can have 40% opacity such as the Mohave Power Plant in Laughlin.

all have been replaced with new units to which a strict 10% limit applies. The companion rule, for post 1981 sources is 10%.

26.1.2.7 For any chemical process in operation on or before January 1, 1981, and for which one or more of the following compounds are manufactured: titanium, titanium tetrachloride, magnesium, magnesium chloride, manganese dioxide, and boron trichloride,

1) The opacity must not exceed 60% obscuration for a period or periods aggregating more than three (3) minutes in any sixty (60) minute period;

2) The opacity must not exceed 40% obscuration for a period or periods aggregating more than 15 minutes in any period of eight consecutive hours;

3) The opacity must not exceed 30% obscuration for a period or periods aggregating more than 30 minutes in any period of eight (8) consecutive hours;

4) The opacity must not exceed 20% obscuration for a period or periods aggregating more than 60 minutes in any period of eight (8) consecutive hours.

26.1.2.8 For any chemical process emission units commencing operation after January 1, 1981 and for which one or more of the following compounds are manufactured: titanium, titanium tetrachloride, magnesium, magnesium chloride, manganese dioxide, and boron trichloride,

a) the opacity must not exceed 10% obscuration for a period or periods aggregating more than three (3) minutes in any sixty (60) minute period.

Nevertheless, the language is somewhat confusing and we hope to amend Section 26 later this year. Since there are no applicable sources anymore, we will amend the rule and delete this category.

At the bottom of page 110 you refer to section 33, which limits chorine emissions. The purpose that you mention of the rule, to limit visible plumes, was actually the secondary reason. Chlorine was released at the rate of over 400 pounds per hour from facilities in the BMI Complex in Henderson until the mid 1980s. The chorine caused the formation of a visible white cloud consisting of ammonium chloride and reacted with organic gases in the air and ammonium nitrate. But the primary problem was that the chlorine accelerated photochemical reactions and this caused

exceedances of the one-hour ozone standard. Systems Applications Inc. demonstrated the chlorine ozone photochemistry in the early eighties.

Implementation of chorine reductions led to attainment of the ozone standard and substantial improvement in visibility in the Southeast Valley,

13) Stationary source permitting (page 111)

In the second paragraph regarding Various Location Permits, the reader may be misled about the statement that larger facilities have been granted VLP permits. There were some abuses when the program started in 1996/1997. That has not been a problem for several years.

Furthermore, there have been supplemental enforcement/inspection efforts undertaken for the last two years. For example, in 1998, three enforcement officers inspected approximately 200 stationary sources and, in 1999, one enforcement officer and one permit specialist with a background in facility audits inspected approximately 100 stationary sources. It is anticipated that a similar type of inspection and follow-up effort will be made in the fall of 2000.

Page 112 (emission factors)

We also cover this in earlier comments. You say the MRI report recommends use of lower emission factors for aggregate operation. On the face of it, this suggests that we are being conservative. The factors we use were developed after considerable review of literature and we think they are more realistic. Given that they are conservative, that means that the emission inventory is at worst making stationary sources more important than they are.

You have a statement about manpower and office space limitations. This topic has represented an ongoing challenge. The overcrowded supervisor office situation you mention was a temporary situation. The supervisor now has her own office.

14) Enforcement of Stationary Source Requirements (p. 112)

The first sentence here is an editorial comment. We would appreciate your reconsideration of the sentence.

The Compliance Section has one (1) person dedicated to, and whose primary essential duties are, stationary source inspections. Additionally, this person handles all of the applicable reporting responsibilities under the 105 Grant agreement for stationary source inspections. Furthermore, this person must conduct "MACT" inspections of 20% of all dry cleaners per year. The total number of sources is approximately 1000 (i.e., major and minor stationary sources, and dry cleaners).

In order to fulfill the grant agreement, all major stationary sources must be inspected at least once each Federal fiscal year. These inspections must be conducted in accordance with the Level II criteria. In late 1998, our inspection schedule matched

the federal requirements. Since then, we have met all of the requirements for stationary source inspections.

The AQD conducts Level II criteria inspections on minor stationary sources.

This program divides the minor sources into 3 groups. They are: synthetic, large, or significant minors; mid-sized minors; and "small" minors. The first group will be inspected on a 3-5 year cycle, the second group on a 4-6 year cycle, and the last group on a 5-10 year cycle.

Our Enforcement Officers frequently conduct the equivalent of a Level 0 or 1 inspection on stationary sources that were exhibiting possible violations of an opacity standard.

The Compliance Section has one (1) person dedicated to, and whose primary essential duties are, gasoline dispensing facility inspections.

Page 113
The fourth paragraph states *"Control measures are currently enforced on several but not all of the most significant area sources in Clark County."* Please specify which significant area source categories the District has overlooked.

15) Local Area Source Regulations (page 114)
The unpaved road paving *"program effectiveness cannot be determined because of the lack of adequate emission reduction accounting."* Please clarify your meaning. The District has measured the effectiveness of the program and has reported this to the Board of Health on several occasions. The accounting is well documented in a registry maintained by the District of credits earned, credits redeemed and credits held by various companies within Clark County.

16) Page 113
Environ's views in the paragraph on page 113 that discusses the lack of adequate staffing and our priorities should be revisited. From another perspective, we probably give stationary sources more attention than they deserve when their role in the emissions inventory is considered. Each day the enforcement officer drives by numerous stationary sources – if there is a PM_{10} problem, it is easy to spot. In the case of the valley's serious non-attainment condition for PM_{10}, stationary sources account for less than 1% of the PM_{10} inventory on days with high winds. (See March 2000 report from Dames & Moore.) Particularly on these days, all of our enforcement officers are deployed and they are looking for excess emissions from stationary and area sources. If Environ reviews the log of notices of violation issued each year, you will note significant attention to stationary sources.

The same paragraph refers to EPA enforcement activity as substantiating the inference that stationary sources have low priority. While we acknowledge that EPA audits in 1991 and 1995 revealed weaknesses in the NSR and PSD programs, we

took numerous substantial steps to resolve the problem area including the establishment of separate New Source Review and Title V sections with deeper staff complement.

Regarding EPA enforcement activity, the District was aware of all of the violations and in most cases had taken enforcement action long before EPA issued their NOVs. EPA's actions have been educational for us and we have updated our procedures to minimize such possibility in current permits that are being written. In no event did we advise any permittees to ignore federal requirements.

Lastly, the paragraph alleges that the AQD advised facilities to ignore federal requirements. This statement is not true. We suspect that some may have distorted the fact that we have not always reminded permittees that they need to comply with the Clean Air Act as well as our regulations.

17) Area Source Permitting (page 114)
The permitting of construction activity is done with standardized conditions so multiple permits can be executed per day. There are 1.5 full-time equivalent persons assigned to this. Area sources also cover the new program areas that are the subject of proposed regulations being heard in May and June: vacant lots, unpaved roads, unpaved parking, paved roads. We are envisioning a significant increase in staff size and office space to accommodate this. Also, stricter regulations for construction activity permitting and control will necessitate more permitting and enforcement staff. But this topic would seemingly be better addressed in your final task report.

18) Summary of Effectiveness of Stationary and area Source Programs (page 115)
As noted before, we do not agree with the characterization of the stationary source inventory for either CO and PM_{10} as being flawed. We agree the area sources (we call them fugitive dust sources) are the major source for PM_{10} violations. As noted elsewhere, public hearings are underway to address the categories of vacant land, unpaved roads, paved roads, unpaved parking lots, and construction activity. These are substantial new rules with significant impacts. This exercise cannot be characterized as the last sentence in the second paragraph as 'fine tuning.'

19) Current Local On Road Mobile (page 115)
The description of the Clark County I/M program does not identify who does what. The program is developed by the Division of Environmental Protection, regulated by the State Environmental Commission, and implemented by the Department of Motor Vehicles. Please clarify this for the reader.

We appreciate this opportunity to comment.

Sincerely,

Michael H. Naylor, Director
Air Quality Division

MN/jh

June 16, 2000

Mr. Dave Souten
ENVIRON
Golden Gate Plaza
101 Rowland Way
Novato, CA 94945-5010

Dear Dave,

The District was disappointed to read many of the elements of the four draft reports that the Environ team generated for SB432. While we agree with a substantial number of recommendations there are numerous characterizations that seem to bias the **incomplete draft report**. On page 4 of Task 4 you reported that there was "a wide impression that the SB432 study was limited to an effort to investigate the Health District." While this was not in the original scope of work, this seems to have become an ultimate aspect of the project.

Report 4 contains a management rating of the Health District. We were not advised that we were being rated and normal protocol would have put us on such notice and have afforded us the opportunity to discuss the preliminary results before the public distribution of the **draft report**.

It has been frustrating that the draft reports have led to a call for action by the chairman of the SB432 Committee, regarding the reorganization of local air quality agencies, even before written comments have been received on the draft recommendations. Furthermore, the call for action was not an item on the agenda of the June 5 Committee meeting nor was there a vote on the matter.

We have a concern that the draft report is being treated as a final report, particularly since the scope of work changed during the study period. Many of your findings verify our views of problem areas over the years. Recent corrections and improvements include:

a) Posting air quality data on the web site with hourly updates
b) Horizontal and Vertical Communications Improvement Plan
c) Written policies and Standard Operating Procedures have been developed and are in the process of being published
d) Developed a "14 Keys to World Class" program providing an ongoing rating system and a path to improvement
e) Doubling of staff in the last four years
f) Increased penalties for which we have received kudos from the EPA
g) Increase in hearing officers
h) E-mail, internet access, the Code of Federal Regulations, and Air Quality Regulations available for all employees,

i) Two new supervisor positions
j) Training guidelines and tools developed and published
k) Two new management positions
l) Hiring of Information Specialist
m) Improvements to the database design and consolidation
n) First clean year ever for carbon monoxide: no exceedances in 1999
o) A reduction in maximum PM_{10} levels of 15% in the last three years
p) Paving of 65 miles of unpaved roads with funding generated by the emission reduction credit program for industrial sources

It is also vexing that the air teams of Comprehensive Planning and the Air Quality Division at the District are very busy in wrapping up the community consultation process in advancing wide spread regulation amendments addressing vacant disturbed land, unpaved roads, unpaved parking lots, stabilization of paved road shoulders and enhancements to permitting and dust control at construction sites at the same time we are reviewing and commenting on the draft reports.

There are many technical misrepresentations and deficiencies within the report. However, given the timeframe for comment, we will focus on what we perceive to be some of the most consequential problems and issues. Therefore, items which should be commented on or responded to with factual information will not be discussed in these comments.

TASK 1 – Assessment of Current and Future Air Quality in Clark County

The District has provided previous responses to Task 1. Our comments addressed AQD's advanced air quality monitoring program which includes continuous visibility measurements, the emissions inventory of stationary sources, our assessment of best available technology for new and modified sources, our emission reduction credit program for minor sources, gasoline vapor recovery system rules, limitations on chlorine emissions, the oxygenated gasoline and cleaner burning gasoline programs. We also informed you of our web site, which now provides air quality data updated each hour. We also described several ongoing evaluation projects being conducted (with funds passed through by the Clark County Health District) by Parsons Engineering (subsidized vehicle repair) and the Desert Research Institute (real time visibility monitoring using photography, remote sensing of particular emissions from vehicles and chemical characterization of $PM_{2.5}$.

The report summarizes some but not all of the air quality trends. It noted the improvements in carbon monoxide. Some may find it remarkable that the number of days per year exceeding the CO standard at the East Charleston/Sunrise station dropped from 27 days in 1989 to zero days in 1999. All other stations have been in compliance for years.

We agree with your characterization of ozone that more data needs to be collected from the western locations of the valley to determine trends.

As for particulate matter, the design value for PM_{10} at the highest station has dropped from 330 µg/M3 in 1995-1997 to 281 µg/M3 in 1997-1999. This is a drop of approximately 15%. We have plotted trends annual averages versus population for the last ten years. Please see Figure 1. As for visibility, the review of data through the end of 1999 shows an intriguing trend of both improvement and deterioration: a drop of days with intense haze (days with visibility at 8am less than 10 miles) but also a drop in the number of days with good visibility (days with visibility at noon above 50 miles).

TASK 2 – Potential Future Air Pollution Control Measures for Clark County
This report provides a most helpful brief analysis of numerous measures that can reduce emissions of CO, PM_{10}, $PM_{2.5}$, VOC and NO_x. The evaluation of control measures needs to gain the benefit of research projects of which a number are underway. The report alleges the lack of coordinated research activities. Much of the research is coordinated by the Health District through pass through grants or through projects recommended by the PM_{10} Emission Control Advisory Committee. There has been no duplicative research but a master compendium of research for access by others would be helpful. For projects exceeding about $20,000, the Board of Health has required requests for proposals. However, the Federal Government has approved projects without using RFPs.

It is a reasonable expectation that a report of this nature would be presented in an objective fashion. However, biases of the consultant are prevalent in all three of the task reports. For example:

- Page 5 of Task 2 in the Environ report says "...perception by some in the scientific community that the quest for an improved scientific knowledge base is jeopardized by privileged treatment of the Nevada University System. That is, a more open procurement process, rather than the sole source award of grants for University research, would result in a better targeted use of available research dollars having the objective of improved and maintained air quality." The presentation of this bias within the report appears to conclude that research funded by local governments is at a premium cost and the scientific competence of the University system is in question.
- Table 3-2 of Task 3 (page 12) compares the District to eight different California agencies. To offset the bias in this specific example, the consultants should have also reviewed, as a minimum, agencies in Arizona, Utah and Northern Nevada.

The report alludes to administration problems with the road paving credit program and recommends that it be discontinued. We acknowledge that the program did have deficiencies with respect to staffing and accounting in 1997/1998. However, the Air Quality Division made corrections and has asked our financial auditors to review our procedures. We have implemented the corrective steps recommended by the auditing firm of Stewart Archibald Barney.

In recent months, the development community and public works agencies have supported the road paving for credit programs. The Board of Health heard such testimony at its April public hearing on proposed Regulation 91.

Page 2, third paragraph
Under "General Methodology: "...cost estimates presented in this report are approximate and a detailed cost analysis specific to the Las Vegas Valley should be performed prior to the formal adoption of any of the measures evaluated here."

The report does not acknowledge the progress that has been made with the road-paving program derived from the awarding of emission reduction credits.

Page 2, table 2-1
We question the report's use a California cost-effective basis for the purpose of evaluating Las Vegas specific control measures. Fundamentally, the problems throughout most of California differ significantly with the problems in the Las Vegas Valley Basin. For example, ozone is a significant problem through California; therefore, cost-effectiveness for VOC and NO_x controls are significantly higher than CO and PM_{10} controls. This is completely the opposite of the Las Vegas Valley where CO and PM_{10} are the greatest concerns and PM_{10} and CO should set the upper limit for cost effectiveness for the Las Vegas Valley.

Page 7
Comments: Unpermitted VOC emission units.

The Environ report claims that the District does not specifically regulate VOC emissions from a variety of emission units. An excerpt from the Environ report follows:
"... Clark County has no rules that specifically regulate VOC emissions from the following industrial sources: wastewater separators, pumps and compressors, valves and flanges, pressure relief devices, asphalt air blowing, spray coating operations, paper coating operations, plastic coatings, rubber coatings, foam manufacturing, and adhesive application."

When Environ visited the District, they did not interview management about this topic.

The statement in the Environ report is technically correct in that the District has no specific rules for the process operations identified in the Environ text. However, many permits have been issued which do regulate and control the process operations known to exist within Clark County. Examples are provided in the following table:

Emission Unit	**Permit ID and (Name)**
wastewater separators	A-00054 (Clark County Sanitation District)
Pumps and compressors	A-00837 (Las Vegas Valley Water District)

Valves and flanges	A-00013 (Calnev Pipeline Company)
spray coating operations	A-00903 (Earl Scheib)
foam manufacturing	A-00406 (Sweetheart Cup)
adhesive application	A-00347 (Morgan Adhesives)

Page 8, second paragraph: **Effectiveness of PM_{10} road paving program**

The Environ report claims that the PM_{10} emission reduction credit road-paving program has not been effective. An excerpt from the Environ report follows:

"In principle, the add-on PM_{10} programs show considerable creativity and have worthy goals. Unfortunately, the programs have not been as effective in the real world as envisioned..."

The objectives for the District's local ERC program are to pave high traffic count unpaved roads and thereby reduce PM_{10} contributions to the local airshed. The program has been successful in paving approximately 65 miles of unpaved roads with a minimum of 150 vehicle miles per day during the last approximately 8 years. The resulting emission reductions, based on AP 42, Emission Factors, 12% silt loading, the lengths of road paved and corresponding VMT is approximately 2,300 tons per year.

Page 8, third paragraph: PM_{10} de minimis threshold.

The Environ report incorrectly describes the PM_{10} de minimis threshold for initiating emission reduction credit requirements. An excerpt from the Environ report follows:

"New and expanding sources which increase emissions of PM_{10} by more than 2 tons per year are required to offset their emissions increases by obtaining emission reduction credits (ERCs)..."

The correct PM_{10} de minimis threshold is 1 ton per year rather than 2 tons per year.

Page 9: "Characteristics of effective programs - Offset programs should operate such that any emission reduction credits that are generated meet the five criteria listed in Federal Law. ERCs should be based on emission reductions that are..."

The report makes a fundamental mischaracterization. The ERC program is not an offset program. This is an important and critical distinction, which was pointed out to the Environ interview team. Offsets are specified in the Clean Air Act and must meet the five Federal criteria. However, the ERC program is a local program, which is separate and distinct from the clean air act. There is no basis or need for the ERC program to meet the criteria in Federal Law. Rather, the ERC program should meet the intent of a local authority that developed, approved and implemented the program.

In addition, the Environ report makes several references to the collection of fees or the use of the ERC program as a revenue source for the District. This is a significant misconception of the program. The District does not obtain revenues from this program. There is a pass-through mechanism to the resident entity that will use the funds to pave dirt roads within the entity's jurisdiction.

Are PM_{10} road paving credits real and quantifiable?

The Environ report suggests that ERCs generated by paving roads are neither real nor quantifiable. An excerpt from the Environ report follows:

"...Emission reductions from road paving often fail to meet one or more federal criteria listed in characteristic #1. For example, because emissions from unpaved roads vary so much with meteorological conditions, soil types, road design, traffic volume and speed, the type of vehicles that use the road etc., paved road credits are particularly difficult to quantify and enforce..."

Unpaved road emissions are calculated using an equation from AP-42 13.2.2.2 [January 1995]. The values chosen for those variables that are difficult to measure are considered conservative and err on the side of under-estimating emissions rather than over-estimating emissions.

The remaining variables are measured for each road-paving event, though measuring soil type remains optional. The following table summarizes the variables used to estimate road-paving emissions:

Variable	Value	Units	Definition
k=	0.36	(<=10um)	Particle Size Multiplier
s=	This is a measured variable (default = 12%)	(%)	Silt Content of roads
S=	23	(mph)	Average speed of vehicles
W=	3	(tons)	Average weight of vehicles
w=	4	(no. of wheels)	Average # of wheels on vehicle
p=	30	(day/yr (for Las Vegas Area))	Annual precipitation
E=	This is a calculated value	(lbs/VMT)	Unpaved Road Emission Factor
ADT=	This is a measured variable	(trips/day)	Average Daily Traffic
L=	This is a measured variable	(miles)	Length of road

D=	365	(days/yr)	Annual operational days
Q=	This is a calculated value	(tpy)	Annual unpaved road PM-10 emissions

As noted above, the local ERC program has no obligation to meet any of the federal requirements. However, emission reductions derived from the Section 12 road-paving program are "Real" because the emission reductions actually occur. They are also "Quantifiable" since set and measured variables are used to determine emission reductions. The reductions are "Surplus" because any local, state or federal law, regulation or other requirement does currently not require them.

Nevertheless, the AQD plans on drafting revisions to the credit program which will limit credits to paving roads of less than 150 ADT. This is because paving of the higher ADT roads would be mandated under proposed regulation 91.

Pages 10-30
The report discusses seven specific examples of methods for controlling dust from so-called area sources to comply with current regulations being considered by the Board. Environ evaluated earlier drafts of the proposed regulations, which have undergone substantial review and revision by local affected parties and as a result of input by EPA. So some of the commentary should be updated. Environ notes that these dust control measures are relatively cost effective. Environ recommends that dust from unpaved roads be controlled by application of gravel. On paper, this may look good as Environ suggests, but local experiences shows that fresh gravel is rapidly ground down into the silt and fine aggregate on the unpaved road. This defeats the purpose so the benefits of gravel as lost in few months. Paving is the only effective and cost-effective means of controlling dust from unpaved roads.

Clark County Comprehensive Planning and the District have consulted with EPA numerous times on Sections 90-94. We agree test methods are time consuming but we cannot use "shortcut" methods that are not approved by EPA Administrator. These rules are expected to be adopted on June 22.

Page 29: Clark County has no rules that specifically limit VOC emissions

The Environ report states:

"...Clark County has no rules that specifically limit VOC emissions from the following area sources: cutback asphalt, emulsified asphalt, marine coating operations, pleasure craft coating operations, coating metal parts, solvent degreasers, architectural coatings, aerosol coatings, graphic arts, screen printing operations, restaurant charbroilers, commercial bakery ovens, decontamination of soil, and charcoal igniter agents...."

Section 60.4 of the AQD regulations specifically regulates the use of cutback asphalt. Section 60.3 specifically regulates surface coating operations, and Section 60.2

specifically regulates degreasing activities. Additional County rules limiting VOC emissions are found in Sections 50, Section 51 and Section 52.

Pages 31 to 40
In your analysis of mobile sources you note that electrification of airport ground support equipment and adoption of California regulations for large off road gasoline engines would yield cost effective reductions of VOC, NOX, CO and PM.

We agree and we urge the state to follow through.

Pages 41 to 52
In this section you discuss improvements to the Clark County I and M program, smoke inspections for on and off road diesel engines, accelerated retirement of older on road vehicles, replacing existing heavy duty engines with cleaner engines, and retrofitting exhaust controls on diesel equipment.

The reports recommended improvements to the inspection program for gasoline vehicles will be critical as an ozone air quality plan is advanced. This issue will undoubtedly receive considerable public debate in the next few years.

The report recommends adoption of regulations requiring the annual inspection of all diesel-powered on- and off-road vehicles for smoke emissions using the snap idle procedure (page 45). This was one of the key recommendations of the Southern Nevada Strategic Planning Authority in 1999 and this element was drafted into an early version of Senate Bill 432, but it did not survive. This recommendation requires more than a change of regulation. This would require legislation. We trust that the SB432 Committee will forward this recommendation to the legislature.

This section also discusses the retrofit of emission control system on engine exhaust systems. We believe this is a case where there could be incentives provided by the state. We are currently monitoring a demonstration project in the Las Vegas area in which catalytic converters have been installed on the exhausts of several diesel trucks. The converters reduce CO, PM_{10} and VOC.

Pages 53 to 63
This section covers transportation control measures and we assume that you have received comments from specialists in this area.

Page 64 to 80
This section covers fuel measures. The AQD has been following this topic for a number of years. We believe that the local and state regulations for wintertime gasoline are the strictest in the country (reformulated gasoline, low vapor pressure of 9 psi, and 3.5% minimum oxygen content). Your discussion notes that the control measures you describe are primarily intended to "lower emissions of ozone precursors."

You note that reduction of summer time gasoline volatility is the most cost effective. Several years ago we pursued the feasibility of this strategy and we ran into a legal 'brick wall.' To adopt stricter rules that the federal government imposes requires that the measures meet a necessity test for attainment. The valley remains in attainment for the one-hour ozone standard. Therefore the valley does not need this measure, nor the other ones suggested such as California phase 3 gasoline or California diesel fuel. The necessity test is included in the Clean Air Act and the Nevada revised statutes. Because of the non-attainment status for carbon monoxide, we could demonstrate the need for reduced wintertime gasoline volatility, the higher oxygen content, and the specification for reformulation. Your report should mention the difficulty posed by the legal barriers.

TASK 3 - Current and Future Funding Requirements for Air Quality Programs
Page 26
The report recommends a $2.00 surcharge on the smog check forms. However, if an increase is made to the smog fee to automobile owners, there will be a public outcry unless the on- and off-road diesels are assessed appropriate fees. Auto owners would not mind an increase if they thought that on & off-road diesels were contributing their fair share.

TASK 4 - Government Roles and Responsibilities for Air Quality Programs in Clark County
Page 5: Is air quality getting worse or getting better?

Consider the following excerpts from the Environ report:

"Although there has been improvement in air quality relative to carbon monoxide, growth and a pattern of inattention to stationary and area sources has led to apparently worsening particulate matter and ozone problems. While stationary and area sources (i.e. non vehicular) contribute very little to ambient CO concentrations, they do contribute significantly to particulate matter and to a lesser degree, to ambient ozone concentrations."

First, It is appropriate to distinguish the influence of stationary and area sources.

In the Las Vegas Valley emission inventories for PM_{10}, stationary sources are not a significant contributor while the area sources are the main cause of the elevated PM10 levels on days which exceed the 24-hour standard. You acknowledged this fact in the task 1 report. Several of the area sources – vacant lots, unpaved roads, and paved roads – are just now coming under regulatory control. Other air districts with the exception of the air district for Maricopa County do not regulate these sources. Their rule was adopted as a result of a federal implementation plan.

We have addressed improvements in CO and PM_{10} at comments for Task 1.

Page 10
Your team recorded an extensive 'laundry list of legislative fixes to the Clark County Air Program. The report cites as a high priority the return of a higher percentage of penalties to the AQD. We agree that this is an item overdue for attention by the legislature. We believe that these funds should not be used for AQD salaries but should be applied to air quality improvement projects.

Page 11
The report appears to denigrate the ongoing AQD staff collaborative process. This perception is not shared by the facilitator, top management and the 20-odd staff still working on projects within the staff collaboration committee who meet for the purpose of improving air quality and operations.

Page 12, first paragraph
Staff training has been enhanced due to staff's collaborative efforts. In addition, the AQD budgets approximately $2,000 per person for training and an equal additional amount for travel each fiscal year. This is much higher than the rate spent on other employees in the District.

Page 20
This page discusses attributes of effective staff management. We score ourselves above average on six criteria, because we perform the functions recommended. For example, we keep the Board of Health informed, and the draft report gives the Board a 3.8 rating. We think it would have been fairer to have been told ahead of time that this was the criteria being used and your team could have afforded us an opportunity to explain how we rated ourselves. We acknowledge that are shorthanded in management staff. We have budgeted this year for two management positions. The managers would fit into the chain of command between the Director/Assistant Director and the section supervisors. Recruitment is currently underway.

Pages 24-27
The ratings are disappointing and unfair. With rapidly growing staff, some time is needed to build up effectiveness in all categories. This section of this report appears to be a management review of air quality programs, operations and personnel. This appears significantly removed from the scope in the original proposal. In addition, there is significant question as to the true qualifications of Environ team to perform a management review as presented in the report. For example, the consultant identifies a scheme for comparing the existing organization to "effective" organizations and appears to overlook many of the substantive issues which should go into the scope of work. For example, the consultant changes the organizations which serve the basis of comparison. In effect, the control group changes. Also, comparisons are made to subjective aspects of a perceived program without the inclusion or normalization of the ratio of managers to employees within the organization, the tenure of the managers in the organizations, the tenure or competency level of the staff in the organization or the comparable ratios of staff to the population and community being served. These things would have significant relevance on the nature of how the collected information should

be interpreted. Instead, blanket and global sweeping generalizations are made without the benefit of detailed thorough competent analysis.

Page 28
The report says "The team evaluation rated the staff... and their salary compensation, particularly at the AQD, was low in comparison to staff in similar air pollution control agencies elsewhere in the nation."

We have little trouble filling positions and we experience low turnover. The lowest paid professional position in AQD is the Enforcement Officer. The position is primarily a field and inspector classification.

For comparison to market rates, we checked the most recent salary survey in the publication "Work & Pay in State and Local Air Pollution Control Agencies," which uses 1997 data. Our salaries are similar to the national average.

Inspectors/Field Staff:

	Entry Level	Mid Level	Senior Level
Clark County (from 1997 survey)	$29,935	$35,834	$41,760
National Average	$29,924	$35,186	$39,159

OBSERVATIONS/CONCLUSIONS

Given the compressed time frame to review and comment, there were many areas which we have not discussed. The four reports are insightful. The community has been abuzz with talk of consolidation of air agencies. We believe that the report's recommendation will lead to positive changes in air quality as well as organizational structure. We are disappointed that the process could not have been more collegial.

Thank you for the opportunity to offer our remarks. Please call if you have any questions.

Sincerely,

Michael H. Naylor, Director
Air Quality Division

MN/jh

Comments On

Task One - Draft Report
Study Of Air Quality Programs In Clark County, Nevada

Department of Aviation
Dennis Mewshaw
Dated: May 5, 2000

1. This is a significant and important effort. If the intent is to produce a serious and valuable contribution to the understanding of the Valley's air quality problems, more than one day has to be provided for the review of draft documents.
2. The draft report contains several unsupported "editorial" comments or observations; [i.e. ".....there appears to be a popular perception that these problems (referring to Valley's air pollution) are getting worse and that no one is doing anything about it" which appears on Page 1; and, "various parties have voiced concerns about lack of adequate data quality control and even deliberate underreporting of peak concentration." which appears on Page 12]. These should be attributed to a reliable source or deleted.
3. The report should add a section addressing the Valley's historic air quality condition and relating those conditions to the Valley's population and urbanization. I believe that it is not insignificant to note that while the Valley has experienced unparalleled growth over the past decade and a half, the air quality (as measured by the number of exceedance events) has generally shown improvement.
4. Repeatedly throughout the report, the influence meteorology (wind, temperature, humidity, mixing height and etc.) has on the ambient air quality and the attainment/maintenance of the NAAQS is cited. Clearly, this is one factor over which the County has no control. Should the report address to what extent it is possible that the Valley will continue to experience exceedance events, because of "adverse" meteorological conditions, even after all reasonable emission reductions have been achieved?
5. A source for Figures 2-7 and 2-8 should be cited.
6. Discussion of ozone attainment indicates the standard is based on the 4th highest daily maximum averaged over three years. I suggest including a table or graphic that provides an historic overview.
7. Page 42 of the report contains the sentence "....large scale population growth results in growing air pollutant emissions and associated air quality degradation." This is not supported by the evidence presented elsewhere in the report that shows the number of exceedance days has declined over the past decade.
8. The discussion of Future Year Inventories on Page 53 fails to make note of the fact that as urbanization continues in the Las Vegas Valley, PM_{10} emissions from vacant lands, and paved and unpaved roadways will decline. The unpaved roads will be paved, the vacant lands built upon, and the track out onto paved roads reduced.
9. A key point made in passing in the report is that for each criteria pollutant there exist one or two dominant sources. Shouldn't the report suggest that the county's limited control, monitoring, permitting and enforcement resources be directed to the critical sources? This

could be accompanied by an acknowledgement that other less significant sources will go unmonitored and/or unpermitted because the benefit/cost ratio of devoting effort to them is not satisfied.

10. The chapter covering the on-road mobile source emission inventory is a little too technical for this report, but should be included by reference. Similarly, the section covering the non-road mobile source inventory lost me with its discussion of multiple approaches to estimating the emissions from non-road sources.
11. Again, on Page 113 this time, the report includes a comment not supported or attributed. The comment is "The lack of adequate staffing levels may reflect a lack of priority on the part of the Health District for maintaining acceptable standards of compliance from stationary sources."
12. To what extent is it true that control measures geared to reduce VOC and NOx may have the unacceptable impact of increasing CO emissions? Should this be addressed in the report's final section?
13. There are numerous spelling and grammatical errors in the draft report.

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DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
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MEMO

To: Dave Ziegler
From: Colleen Cripps
Subject: ~~Review Draft Report Comments~~
Date: June 8, 2000

I apologize for responding so late to your request for comments, but I did not receive a copy of the report until well after the comment deadline and was unaware that you were including an evaluation of information maintained by the Bureau of Air Quality. Although there were a number of grammatical and typographical errors in the draft report I reviewed, I assume that those have been addressed by now and so I will limit my response to those substantive errors that directly relate to the Bureau of Air Quality.

~~On page 35, Clark County's ozone status and trends are discussed~~. I find it odd that ozone is the only pollutant for which you rely on the state trend report for information. These data are supplied to us by the county and should be available in their own annual report or from the AIRS data base. Also, the way the first paragraph reads, it appears that your 8-hour ozone information also comes from the state trend report. ~~The source of this information should be clarified.~~

~~On page 6 in the second paragraph, you state that the data maintained by BAQ is of questionable accuracy and then proceed to compare information reported on an EPA website for 1992 to BAQ's 1999 emissions report for the facility as proof of lack of quality assurance.~~ The comparison you make has a number of problems that need to be corrected or at least identified in your report. First, by comparing total suspended particulate, the 1992 data, to PM10, the 1999 data, you automatically introduce approximately a 50% error. Second, the 1999 emissions estimated by BAQ for this facility are only for those emission units permitted by BAQ. This would only include the boilers, not the turbines or any other emission units permitted by the Clark County Health District. Third, and most significantly, you appear to be comparing potential to emit (the maximum emissions allowed under our current state regulations) to actual emissions. The maximum allowables are based on unlimited operation, uncontrolled emissions and the use of fuels with the potential to generate significant amounts of emissions. This number, the maximum allowable, has no basis in reality. The emission numbers you quote for 1999 are actual emissions reported to us by the facility. The low emissions reported to us are the result of limited hours of

operation at this facility and the use of primarily natural gas (a cleaner burning fuel) over fuel oil. These emissions levels are consistent with emissions reported in past years. Finally, I suggest to you that the EPA data base has some significant problems. It is unclear to me where EPA's data originated, but BAQ has recently been made aware that there are other Nevada facilities in this data base whose emissions have been seriously over estimated. We are working with EPA to correct these errors.

~~We disagree with your assertion that BAQ's data are incorrect.~~ If you wish to accurately compare 1992 to 1999 emissions data in your report, BAQ would be happy to provide you with 1992 data that is based on assumptions similar to the 1999 data you received from us. I look forward to hearing from you. I can be reached at (775)687-4670, extension 3065.

REGIONAL TRANSPORTATION COMMISSION

600 S. Grand Central Parkway, Suite 350 • Las Vegas, NV 89106-4512 • (702) 676-1500
Fax: (702) 676-1518 • TDD: (702) 676-1837

JACOB L. SNOW
General Manager

Clark County
BRUCE L. WOODBURY, Chairman
DARIO HERRERA

City of Boulder City
BRIAN NIX, Vice-Chairman

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City of Henderson
JAMES B. GIBSON

City of Mesquite
CRESENT HARDY

July 18, 2000

Dave Souten
ENVIRON International Corporation
101 Rowland Way, Suite 220
Navato, CA 94945

COMMENTS ON TASK 2, DRAFT REPORT - AIR QUALITY PROGRAMS IN CLARK COUNTY

Mr. Souten:

Thank you for the opportunity to comment on the draft report on air quality programs in Clark County. Enclosed are the Regional Transportation Commission's comments on the Environ draft report. Overall, I thought the report was well done. Our comments are not substantial, but we did want to clarify some of the information and assumptions in the draft report.

If you have any questions, please contact me or Wayne Meissner at (702) 676-1500.

Sincerely,

for JACOB L. SNOW
General Manager

JLS:tm

Enclosure

REGIONAL TRANSPORTATION COMMISSION
CLARK COUNTY, NEVADA

MEMORANDUM

July 13, 2000

RTC 07/14/00 PM 1:42

TO: JACOB SNOW, GENERAL MANAGER

FROM: WAYNE MEISSNER, TRANSIT MAINTENANCE ADMINISTRATOR

SUBJECT: EVALUATION OF RECOMMENDED MEASURES FOR ON ROAD EMISSION REDUCTIONS WITH REGARD TO CAT FLEET

This evaluation of the recommended measures for on road emission reductions identified in the Environ report describes actions and costs associated with those measures which effect the Cat bus fleet.

MEASURE TITLE: Repowering of existing heavy-duty diesel vehicles (HDDVs) to operation on natural gas or with low emission diesel engines.

The current Cat HDDV fleet consists of (295 buses). Currently (188) are equipped with newer low emission diesel engines, ninety (90) are currently being repowered with new low emission engines and seventeen (17) are being replaced in the near future.

The cost to repower the ninety(90) buses with new low emission engines is $51,235.00 per bus, $4,559,915.00 total. This project is scheduled for completion within 16 months.

The Environ report represents the cost to repower at $35,000.00. This is $16,235.00 lower than the actual cost.

MEASURE TITLE: Retrofit of existing heavy-duty diesel vehicles (HDDVs) with selective catalytic reduction (SCR) and /or PM traps.

The current Cat HDDV fleet (295 buses) with the exception of seventeen (17) buses are equipped with catalytic converters. These converters were provided on the buses from the original OEM when the buses were purchased, with exception of the ninety (90) 1992 Newflyer buses which were originally equipped with PM traps. The PM traps originally provided on the ninety (90) Newflyer buses were removed in 1994 and replaced with catalytic converters due to the high rate of failure of the trap.

The Cat bus fleet with exception to the seventeen (17) buses which are due to be replaced in the next replacement cycle are equipped with this technology. The original price of the buses included this cost. This measure has no future impact to the RTC other than the price impact to the cost of new buses. The cost which is represented in the report as $2,500 is accurate.

MEASURE TITTLE: Natural gas vehicle (NGV) fleet rule.

This measure is limited to light-duty cars and trucks. The light-duty buses used to provide paratransit service and any RTC support vehicles such as sedans, pickups and vans fit this group.

The current paratransit bus fleet of (124) consists of (121) CNG powered and (3) unleaded gasoline powered buses. The RTC support vehicle fleet of (46) sedans, pickups and vans consist of (45) unleaded gasoline powered and (1) CNG powered vehicle.

The current vehicle replacement schedule is to replace (78) of the paratransit buses with CNG powered converted vans, (29) of the paratransit buses with CNG powered small buses, (10) of the support vehicles with CNG powered converted vans and any other replacement of support vehicles with CNG powered like vehicles.

The cost impact of the CNG verses gasoline powered for the converted vans is approximately $4,000.00 per van, small buses is approximately $17,000.00 per small bus and sedans/pickups is approximately $3,000.00 per vehicle.

MEASURE TITLE: Implementation of CARB "Clean" diesel fuel

Currently the RTC is using CARB diesel fuel for the Cat HDDV transit fleet. The RTC will continue to use this fuel through an agreement with the Clark County Health District for approximately eight months. The use of this fuel did not require any changes to the buses, fueling equipment or operations. The RTC has used 2,140,745 gallons of this fuel from February to June 30, 2000 with no performance related incidents.

The additional cost to use the CARB diesel fuel verses Low Sulfur diesel fuel varies from day to day. The cost impact to use this fuel from February through June 30, 2000 has averaged $40,216.55 per month for an average of 428,149 gallons per month, or an average of 9.4 cents per gallon.

Note: See attached usage report.

MEASURE TITLE: Purchase of new natural gas fueled heavy-duty diesel vehicles (HDDVs) instead of new vehicles with diesel engines for fleet applications.

The RTC's purchasing schedule for the HDDV's for the Cat transit system currently include the purchase of (7) CNG powered 40 ft. low-floor buses and (6) low sulfur diesel powered 60ft. articulated buses.

Currently the bus engine manufacturers do not provide a certified CNG engine with the required horsepower rating for 60ft. articulated buses. Also, the bus manufacturers do not offer a 60ft. articulated bus with CNG fuel storage.

The price impact for a 40ft. Low-floor transit bus CNG powered verses diesel is estimated at $50,000 per bus.

Verification of cost for a paratransit bus on page 60.

The figure of $17,000 must represent the cost difference between a CNG powered paratransit bus and a gasoline powered paratransit bus. The actual cost of a CNG powered bus per our latest bid responses has been $139,208.00 to $189,805.00.

SIERRA CLUB
FOUNDED 1892

Southern Nevada Group
P.O. Box 19777, Las Vegas, NV 89132

July 18, 2000
David Souten
Environ
101 Rowland Way, Suite 220
Novato, CA 94945

Dear Mr. Souten

I have reviewed the Senate Bill 432 Draft Final report. Following are my comments and concerns.

The report seems to be a comprehensive overview of all aspects of Clark County's air quality situation. As such, it is a good start toward addressing the air quality problems of Clark County.

The report enumerates many serious lapses in the administration of air quality programs by the Air Pollution Control District. There were also numerous credible charges, made by employees and former employees, of improprieties in this agency. These lapses need to be investigated thoroughly. For instance, a full audit of the offset program is called for. Also, if it is true that relatives and close associates of Clark County Health Department management are not being required to adhere to air quality regulations it is imperative that this be brought to light and rectified.

The Clark County Health District would ask us to have faith in their regulatory efforts. That is impossible when, for instance, the district, at this critical hour, is proposing new PM 10 regulations that are designed in such a way as to exempt virtually all vacant land from fugitive dust control (Page 3-10).

The monitoring program is another problem area. As the report points out numerous allegations questioning the veracity of the monitoring program have been voiced. Allegations of monitors being taken off line for maintenance at the time that an exceedance is likely have been raised. The fact that there is no monitoring station at a known CO hotspot near the junction of US 95 and Eastern Avenue is disturbing. An audit of this program will need to be done.

These are only a few examples of the questionable practices and allegations of wrong doing, featured in the report, on the part of the current administration of the CCHD, which has lead to a pronounced lack of credibility. As any proposed reorganization will take a number of years to fully implement, some effort to restore integrity to the current system is necessary. I hope a recommendation for a full housecleaning of the CCHD on these issues is in the final report.

SIERRA CLUB
FOUNDED 1892

Southern Nevada Group
P.O. Box 19777, Las Vegas, NV 89132

I support Environs proposed reorganization. State oversight and one streamlined agency seem to be needed to make further progress on our air quality problems. I want to also reiterate;

1) the need to select the Executive Director of this agency through a national management recruiting effort so that this agency is not perceived as, or in reality is, just a shuffling of the current personnel,
2) that this agency "operate behind a firewall that separates individual cases from political influence."
3) that governing board members should be prohibited from intervening in decisions on individual enforcement cases and permit conditions on behalf of companies that they might favor or with whom they have a business relationship.

Sincerely,

Margaret C. Pierce
Southern Nevada Group of The Sierra Club
Member of the Advisory Committee to the S.B. 432 Subcommittee

From: Russell Roberts
To: inet:dwilliams@lcb.state.nv.us
Date: Mon, May 15, 2000 3:25 PM
Subject: SB432 Task 1 Draft - Comments

I have reviewed the document. I have only two comments:

1. The document identified the need to address PM-10 emission inventories on a more accurate, localized basis. We have recently completed micro inventories for PM-10 at the five sites that we are using for the attainment demonstration. The inventory was developed utilizing an EPA approved methodology that combines Chemical Mass Balance analysis with a field inventory of sources around each of the five sites. It is our position that this inventory is the most accurate inventory ever done for Clark County and more than meets the adequacy test for SIP purposes. The report should recognize the completion of this work as part of the 2000 PM-10 SIP.

2. Clark County Department of Comprehensive Planning has long recognized that the stationary and area source inventories are in need of significant improvement. However, in determining the best course of action to successfully address the CO and PM10 SIP requirements, we chose to use the available time and resources to focus on the portion of the inventories that mattered the most, i.e., mobile sources for CO and fugitive sources for PM10. The report indicates that although the inventories are inaccurate in regards to stationary sources, "they do not materially affect compliance with the CO NAAQS." (pg 115). We believe this is true in the case of PM-10 as well. Given the importance of this report and the attention that the public and media have focused on this issue, we would recommend that the referenced statement be emphasized and explained in greater detail.

We appreciate the opportunity to comment. We look forward to reviewing the other reports. If you have questions, please contact me at 702-455-5199.

CC: Holmes, Richard; Naylor, Michael; Robinson, Chri...

Department of Comprehensive Planning

500 S Grand Central Pky • Ste 3012 • PO Box 551741 • Las Vegas NV 89155-1741
(702) 455-4181 • Fax (702) 385-8940

John L. Schlegel, Director • Phil Rosenquist, Assistant Director • Lesa Coder, Assistant Director

July 25, 2000

Mr. Dave Souten
ENVIRON International Corporation
101 Rowland Way, Suite 220
Novato, CA 94945

Re: Comments on Final Draft of the SB432 Reports

Dear Mr. Souten:

We have reviewed the final drafts of the Task 1-5 reports prepared by your team. We would again state our recognition of the effort that the Environ team has put into the study and would commend the fact that, at the very least, it has been the genesis of a substantial public discussion on this important issue. Although we continue to have a number of significant disagreements with parts of the study, overall we remain optimistic that the net change in the air quality programs in Clark County will be positive. We have additional comments as outlined below. Our comments are referenced by page number and issue title.

Page 1-2: Introduction: We would question the logic of the conclusions made in the last two sentences of paragraph 4. Basically, Environ seems to be using the widely variate concerns expressed by the report's reviewers as an indicator of balance. Although this is certainly not a major point, there are alternative conclusions that one could make that would be more critical of the success of the Environ attempt at meeting the goal of the study, as a more accurate explanation of what the stakeholders' concerns are. Given the proclivity of Environ to focus on solutions born of their collective experience in the state of California, we would not agree that this report is balanced in many areas. We remain concerned that there is an implicit theme throughout the report that what is effective in California is needed in Nevada.

Page 1-3: The sentence in the third paragraph, "However, as some of the commentors made clear, reorganization *per se* does not assure successful air quality management.", is perhaps one of the most important statements in a report of over 300 pages. As we move forward and examine the available options, we would hope that this statement is not forgotten. Attached to these comments is an outline of what we believe is and is not achieved with integration.

Page 2-51: The paragraph at the top of the page notes a lack of microinventories for PM10 sources near monitoring sites. As we noted previously, we have completed a two-kilometer micro inventory for each of the five sites we are using for the 2000 PM10 Attainment Demonstration. We would request that the final report note this fact.

BOARD OF COUNTY COMMISSIONERS
BRUCE L. WOODBURY, Chairman • ERIN KENNY, Vice-Chair
YVONNE ATKINSON GATES • DARIO HERRERA • MARY J. KINCAID • LANCE M. MALONE • MYRNA WILLIAMS
DALE W. ASKEW, County Manager

Page 2-59 et seq: Methods for Inventory Preparation: There are at least a couple of issues in this section that can confuse the reader or lead them to an incorrect conclusion. The first is in the area of recommended models to be used for inventory preparation. If we understand Environ's statements, they are recommending that Clark County use a combination of the T2AT model and the NONROAD model. Both are models created by the EPA. However, we believe that Environ is aware of the "rules of the game", as set by the EPA, that we are required to follow. That includes using models approved by the EPA for SIP use. Neither of the models specified are, to our knowledge, approved by the EPA for SIP use. As the Environ team knows, having done much of the mobile source inventory work that is currently being used in the 2000 CO SIP, we did use the growth factors out of the NONROAD inventory, which, we note with some irony, the EPA is currently questioning. Also, as Environ knows, EPA did allow Environ, on our behalf, to modify the MOBILE emission factors to take into account the benefit of off-cycle emissions and lower sulfur gasoline. However, to secure EPA approval for the approach Environ suggested would be a lengthy petition process with a highly uncertain outcome. We would reiterate our frustration over the lack of an approved model that allows us to quantify the benefits of Tier2, the Heavy Duty Diesel low sulfur fuel and emission standards, and OBDII. We also remain skeptical, given the history of MOBILE models, that MOBILE6 will be the panacea we all hope and need it to be. Our greater point is that this is a critical area that is beyond our ability to control and one for which Environ has suggested a solution that, if we understand it correctly, is not likely to be EPA-approvable at this time.

We are also concerned that Environ seems to be attempting to make a case for including the entire county in the inventory for all pollutants, including Carbon Monoxide. It is well known that the boundary of the nonattainment area, and the area that the inventory must focus on, is Hydrographic Basin 212. We do not understand, nor did the report explain, what the benefits would be of including all Clark County sources of CO in the inventories. For example, since there would be no measurable benefit from reducing CO in Mesquite on the problem monitor in Sunrise Acres, we would question how it would be beneficial to include sources of CO from that area in either the inventory or the control measure requirements. The same would be true for PM10, the other nonattainment pollutant currently of concern. Scaling the inventories to the boundaries of Basin 212 for PM10 and CO has been accepted by the US EPA and is only really a valid point for further discussion within the context of ozone and perhaps PM2.5.

Page 3-1: Identification and Evaluation of Potential Future Air Pollution Control Measures: We would reiterate our point about being cautious in proposing control measures of any kind. We believe that, ultimately, only those measures that are clearly necessary for attainment are defensible. We have enclosed a recent article from the Los Angeles Times regarding the South Coast AQMD's proposal to accelerate the federal low sulfur diesel program within its jurisdiction. The arguments will be the same here in Clark County for this or any other program that is being proposed on any basis other than being necessary for attainment.

Page 4-2: CMAQ Funds: We agree with that statement regarding the importance of these funds. Working with the local Public Works entities and the RTC, Clark County has secured commitments

to utilize CMAQ funds to pave all of the high ADT unpaved roads in the nonattainment area. As these roads are paved in accordance with the SIP, we believe that there will be logical opportunities to pave other unpaved roads with these funds, further reducing the PM10 impact of this source.

Access to Fine Monies and Excess Reserve Funds: Part of Clark County's legislative agenda for the next session includes a proposal to secure a large portion of the fine monies for use in the local air quality programs as well as a proposal to give the county dedicated access to the one dollar from the Smog Check fund that we currently utilize and priority access to the Excess Reserve Funds. We expect both proposals will be difficult to bring to a successful conclusion.

Page 5-10: SB511 Discussion: This is a comparatively minor point, but the short discussion on SB511 in the third paragraph is not completely accurate. What SB511 really accomplished was to allow other agencies to access Excess Reserve funds that were created due to the Smog Check fee, thereby increasing the amount of money being allocated out of the fund every year. The net effect is that there is less money available for use by State and local air quality agencies.

Page 5-11: Mid-Priority Legislative Changes: The issue of the attainment area boundaries is one that will be addressed if and when the county exceeds the NAAQS for either PM2.5 or Ozone. Changing the boundaries of the Nonattainment Area does not require or need legislative approval. In the less-priority area, Environ suggests a fund to support voluntary air quality programs. For the record, the CCHD has requested $500,000.00 from the Excess Reserve Fund this year to support the continuation of cleaner diesel fuel use in the RTC and CC School District fleets. Clark County, the CCHD and the DMV co-sponsored a Voluntary Vehicle Repair program that utilized a $900,000.00 grant from the Excess Reserve Fund. That program will meet its goal of repairing 1,200 vehicles that fail a Smog Check test.

Page 5-12: Individual Competence: The short comment in the third paragraph attributed to the County Manager's Office is another example of a critical point that deserves more emphasis. (The comment was that individual competence was more of a problem than the organizational structure.) It would be our position that agencies are made up of people, and any structure can be made to work as long as the right individuals are in the right positions. ENVIRON could have made a more compelling argument to support its recommendation for a single agency had it provided an assessment of whether the existing agencies have the right managers and management structure, have adequately trained and compensated staff housed in adequate quarters, and have the resources needed to function at the level required. There appears to be little consideration given to the potential for improving the effectiveness of the existing agencies before embarking on the difficult task of creating a new agency.

Page 5-30: Organizational Changes: ENVIRON'S recommendation to establish a single agency has captured attention and become the focus of much activity. The Regional Planning Coalition is currently working on an interlocal agreement that would accomplish this goal. The Board of County Commissioners and other local entities support this effort. One area of concern to us is the discussion on page 30 regarding efficiencies and streamlining that would be expected from creating a new agency. We do not believe that will occur. Both the Air Quality Division and the

Comprehensive Planning Air Quality Team are currently supported by the larger organizations within which they exist. A new independent organization will require all that support staff and other overhead (finance, human resources, purchasing, etc.) that is now provided by Clark County and the Health District. We believe that the costs of establishing a new agency should not be minimized.

General Comments: Senator Titus has expressed a concern over the environmental fate of the suppressants and stabilizers that will be used as a result of the new dust control rules. The CCHD, Comprehensive Planning, the Regional Flood Control District and the Southern Nevada Water Authority are currently working on funding a proposal by UNLV to study this issue over the next 18 months. We are also aware of the proposal to have the NDEP certify these products, which we support in concept, as long as the NDEP is given the resources necessary to undertake this responsibility.

Finally, in Appendix F, there is a page of comments attributed to Russell Roberts regarding the Task 1 Report. Those are not Mr. Roberts' comments. We would speculate that those are actually the comments of the Department of Aviation staff that were submitted on their behalf by Comprehensive Planning. Mr. Roberts' actual comments on Task 1 are attached for clarification (his e-mail of May 15, 2000). We would appreciate having this error corrected in the final draft.

We appreciate the opportunity to comment on these reports. If you have any questions or need clarification on any of our comments, please contact me at (702) 455-3115 or Russell Roberts at 455-5199.

Sincerely,

JOHN L. SCHLEGEL
Director

enc.
cc:
Legislative Subcommittee members
Donald O. Williams, LCB
SB432 Advisory Committee members
Regional Planning Coalition members
Dr. Donald Kwalick, CCHD

WHAT DOES AND DOESN'T GET FIXED WITH INTEGRATING THE TWO AIR AGENCIES

WHAT GETS FIXED:

-One Executive officer and one Board is accountable for the outcomes.

- One agency is responsible for all areas of air quality planning and regulation.

- Lines of communication between planners and other AQ professionals are shortened.

WHAT MIGHT GET FIXED(IF YOU HAVE ENOUGH $, THE RIGHT EO, THE RIGHT BOARD):

- Agency structure could be optimized for improved performance.

- Salary and compensation issues could be addressed.

- Training issues could be addressed.

- Management structure and performance could be optimized.

- Work space and support resource issues could be addressed.

- A more effective outreach program could be developed(?).
NOTE: All of these things, to the extent they are real issues, could be addressed without integration.

WHAT DOESN'T GET FIXED BY INTEGRATING THE AGENCIES

- The EPA does not change the way it does business, nor does it reorganize itself with additional resources to better serve the needs of its client states.

- The SIP process remains under the control of the EPA and therefore does not get easier or more efficient.

- The perspective of other Federal, State and local agencies on air issues and their level of support and cooperation does not change.

- Land Use, Transportation and Air Quality decisions remain unintegrated. The key to solving air quality issues therefore remains unaddressed.

- The current effort underway in Comp Planning to integrate Transportation Planning and Air Quality Planning will be interrupted, if not significantly damaged.

- The methodologies and motivating factors employed in developing and funding Transportation Improvement Plans does not change. Ensuring that TIP projects are conducive to air quality will remain problematic.

- Ensuring transportation conformity is no easier or more efficient.

- Since Comp Planning will contribute at most 1 manager and 6 planners, there are no savings or efficiencies to be realized through reductions in Administrative overhead or by combining positions.

- The state agencies involved will still have limited technical resources that they can use to assist the local efforts.

- The state salary structure for AQ professionals will remain below what is necessary to attract and retain the number of new staff necessary for a "beefed up" state role. This issue will also affect the local agency's ability to hire new staff even if all salary and compensation issues are addressed.

Panel Seeks Early Deadline on Cleaning Up Diesel Fuel

■ **Pollution:** Agency wants new rules implemented in 2004 in Southland, not 2006 as scheduled. But opponents fear shortages and soaring prices.

By MARLA CONE
TIMES ENVIRONMENTAL WRITER

Regional air quality regulators are proposing that Southern California move ahead of the nation in imposing strict new controls over diesel fuel—a step that state officials call extremely risky and likely to trigger fuel shortages and skyrocketing prices.

The outcome of the escalating feud between state and regional officials could have a major impact on the economy and the health of Southern Californians.

Diesel engines—which spew voluminous amounts of carcinogenic soot and smog-causing gases—are one of the state's largest sources of air pollution. They also power the trucks that carry most of the state's goods—from food to hardware—as well as tractors, bulldozers, airport equipment and ships.

Nationwide, the federal government announced a plan in May to slash the sulfur content of diesel fuel by 97% in 2006. But the South Coast Air Quality Management District is moving toward setting an earlier deadline—2004—that would apply only to fuel in Los Angeles, Orange, Riverside and San Bernardino counties.

This week, two senior aides to Gov. Gray Davis, the heads of the California Air Resources Board and the state Energy Commission, sent a strongly worded letter to the AQMD, calling its proposal "both unnecessary and extremely risky."

The Los Angeles region would be "likely to face periodic disruption in [diesel fuel] supply with potentially dramatic price increases and potential shortages," according to the letter from Michael Kenny and Steve Larson.

But AQMD Executive Officer Barry Wallerstein shows no signs of backing down. Today, the agency's board is expected to schedule a hearing and vote on the proposal in September.

Wallerstein said there is no reason to wait two extra years to clean up diesel exhaust. The AQMD staff analyzed the issues and concluded that oil refineries will be able to produce adequate amounts of the new diesel fuel in 2004, he said.

"If there is demand, there will be supply," he said.

But state officials—remembering a diesel fuel crisis in 1993—call

Please see DIESEL, B7

DIESEL

Continued from B1

that approach foolhardy. California's oil industry and trucking companies agree.

Kenny, executive officer of the state air board, said in an interview Thursday that he would overturn the AQMD's rule if it is adopted. The state agency has veto power over local air quality rules although AQMD officials say it remains to be seen whether the agency would actually make good on its threat.

Because the equipment to refine the new fuel is extremely expensive, Kenny said, only a small number of oil companies would probably gear up to produce it in 2004. As a result, if accidents or production problems shut down any of those refineries, diesel operators could face shortages and exorbitant prices, he said. Fuel produced in other states would not comply until 2006, leaving California with no backup for two years.

"The South Coast [Air Quality Management District] doesn't really fully understand the implications of what they are proposing," Kenny said. "They don't have experience with regard to fuels at all, and they don't understand the nuances of fuel issues, and the pricing and marketing."

Truckers Fear Higher Costs

The California trucking industry, which endorses the 2006 national deadline, also warns of dire consequences.

"You could have $5-a-gallon fuel down there [in the Los Angeles region.] It's just a disaster," said Stephanie Williams of the California Trucking Assn. in Sacramento. "This is the No. 1 issue for our members. It could put all those companies down there out of business."

Of the trucking group's 2,500 companies, 60% are located in the Los Angeles Basin. Williams predicts that those companies will buy their fuel outside the Los Angeles Basin if the 2004 local deadline is approved.

Michael Wang, environmental manager of an oil company group called the Western States Petroleum Assn., said fuel standards should be left to national or state control.

"I don't think it's a smart move," he said about the AQMD's proposal. "There are real constraints to having a regional fuel. Every time you make a fuel more and more unique, it leaves less of a safety net for the consumers. The supply / demand issues are so very, very tenuous here in California."

Environmental groups, however, support the AQMD's proposal.

"The state's not prepared to regulate the diesel industry as much as it should. That's why we have polluting vehicles on the road today," said Gail Ruderman Feuer of the Natural Resources Defense

Kenny and Wallerstein seem adamant in their stances. Some observers say it has become a battle of wills between the state's two smog czars.

"We're the child caught in the middle between the fighting parents," said Williams of the trucking association.

The staffs of the AQMD and the Air Resources Board—the nation's two most powerful air quality agencies—have disagreed several times in recent months about regulations for diesel trucks and buses.

The state agency historically has set pollution standards for fuel and vehicles, developing a worldwide reputation for pioneering and aggressive standards. But the AQMD, under Wallerstein's rule, has been unhappy with the state's pace for diesel engines because of the pervasiveness of the exhaust in the Los Angeles region. As a result, the AQMD has begun to forge its own path.

Wallerstein said the AQMD decided to shift its focus toward diesels after determining that 70% of the cancer risk from the Los Angeles region's air pollution comes from diesel exhaust.

Seeking to Curb Sulfur

While factories, automobiles an other sources of pollutants have already greatly reduced their emissions, he said, diesels lag behind pollution control.

"It's time for diesels to step up the plate," Wallerstein said.

He is unconvinced that the ru would cause fuel shortages, Walle stein added. "Where is their evidence? This is well-known technology, and the refiners indicate th can make the changes within fo years," he said.

Reducing sulfur in diesel fuel considered one of the single mo important rules to control air poll tion. Without ultra-low sulfur fo diesel engines cannot be equipp with newly developed soot filte and catalysts that can reduce truc and bus emissions by 90% to 95%

State officials said that if t AQMD rule is adopted, Californi refineries would have to be wor ing at full capacity to ensure an a equate fuel supply.

AQMD officials "are betting th everything will work perfectly every refinery for two years and t don't think that's realistic," sa Jerry Martin, spokesman for t state air board.

State officials know from de ades of experience that air quali rules can disrupt supplies a prices.

In 1993, California suffered a di sel fuel shortage and 50-cent-a-g lon price hikes when oil refineri

From: Russell Roberts
To: inet:dwilliams@lcb.state.nv.us
Date: Mon, May 15, 2000 3:25 PM
Subject: SB432 Task 1 Draft - Comments

I have reviewed the document. I have only two comments:

1. The document identified the need to address PM-10 emission inventories on a more accurate, localized basis. We have recently completed micro inventories for PM-10 at the five sites that we are using for the attainment demonstration. The inventory was developed utilizing an EPA approved methodology that combines Chemical Mass Balance analysis with a field inventory of sources around each of the five sites. It is our position that this inventory is the most accurate inventory ever done for Clark County and more than meets the adequacy test for SIP purposes. The report should recognize the completion of this work as part of the 2000 PM-10 SIP.

2. Clark County Department of Comprehensive Planning has long recognized that the stationary and area source inventories are in need of significant improvement. However, in determining the best course of action to successfully address the CO and PM10 SIP requirements, we chose to use the available time and resources to focus on the portion of the inventories that mattered the most, i.e., mobile sources for CO and fugitive sources for PM10. The report indicates that although the inventories are inaccurate in regards to stationary sources, "they do not materially affect compliance with the CO NAAQS." (pg 115). We believe this is true in the case of PM-10 as well. Given the importance of this report and the attention that the public and media have focused on this issue, we would recommend that the referenced statement be emphasized and explained in greater detail.

We appreciate the opportunity to comment. We look forward to reviewing the other reports. If you have questions, please contact me at 702-455-5199.

CC: Holmes, Richard; Naylor, Michael; Robinson, Chri...

Department of Comprehensive Planning
Environmental Division

500 S Grand Central Pky • Ste 3012 • PO Box 551745 • Las Vegas NV 89155-1745
(702) 455-4181 • Fax (702) 385-6940

John L. Schlegel, Director • Christine Robinson, Planning Manager

June 19, 2000

Mr. David Souten
ENVIRON International Corporation
101 Rowland Way, Suite 220
Novato, California 94945

Dear Mr. Souten:

RE: Review of SB 432 Draft Report Air Quality Tasks 2-4

We have received your report and it has been reviewed by our staff. We have included our comments under this cover. It is our hope that our comments and the issues they raise are recognized and integrated into the final report. In any case, we would like them made a part of the record.

If you have any further questions please contact Christine Robinson, Environmental Planning Manager, at 702-455-3536; or Russell Roberts, Assistant Planning Manager - Air Quality, at 702-455-5199.

Sincerely,

for

JOHN L. SCHLEGEL
Director

JLS/CR/RR:sgh

cc: Senator Jon Porter
Senator Dina Titus
Senator Mark James
Assemblyman Bob Beers
Assemblyman David Parks
Assemblyman Doug Racht
Advisory Committee on Air Quality

BOARD OF COUNTY COMMISSIONERS
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DAN W. ALDEN, County Manager

We have reviewed the Draft Reports for Tasks 2-4. We offer our comments as follows:

Task 2 Report: Identification and Evaluation of Potential Future Control Measures

-Research Coordination:

We disagree with the statement on page 5 regarding the "very little apparent effective coordination between various institutions funding research and/or regulatory agencies to which the research results should be directed." The report continues in the same paragraph to express an opinion that " ...there is probably a significant lack of effectiveness of such research." Neither is the case.

There have been comprehensive studies on particulate pollution and its sources conducted in the Las Vegas Valley which are considered to be among the most definitive studies ever completed. Additionally, a careful review of the current research projects underway would have illustrated the fact that we undertake a consultative process involving all the stakeholder agencies in carefully reviewing research proposals. The proposals themselves, particularly those from the publically funded research institutions, meet any standard applicable. Most of the problems that we have had with research studies deal with the area of contractor performance - particularly in the area of private consulting companies. We note that the report does not delve into this potentially sensitive area.

Given the implications of statements regarding the reputations of both the agencies involved and the institutions conducting primary research in this field, the statements should be retracted, a comprehensive review of just what has been done - and how - should be completed, and factual conclusions should be drawn accordingly.

Finally, we would note that the report is careful to omit the fact that much of the primary research that the local agencies have undertaken in support the SIPs is designed to create information that the U.S. EPA should have already completed. A fair and thorough review should have identified the lack of attention to western PM-10 and Carbon Monoxide issues by the EPA as a major problem and challenge. Avoiding significant criticism on the role and function of the U.S. EPA in the Las Vegas Valley as a contributing factor to effectively solving local air quality issues is an issue throughout these reports.

-Perceptions of the Scientific Community:

We are concerned with the statement on page 5: "Aggravating the situation, at least to some degree, is the perception by some in the scientific community that the quest for an improved scientific knowledge base is jeopardized by privileged treatment of the Nevada University System." Again, this is by the report's own language a perception, and is not reflective of the facts.

As the Environ staff well knows, having done publicly funded air quality work in the Las Vegas Valley, the agencies involved do utilize private contractors and a procurement process that is open and fair. We recognize that some consultants may feel left out of the process. However, we utilize a sole source approach, which allows us to utilize the services of the Desert Research Institute only in instances where time is critical and there is a need to reduce the completion schedule. Contrary to the "perception" of favoritism, it is in reality a method utilized to effectively deal with the time-constrained circumstances created by the Federal Clean Air Act. Finally, it is not clear to us from the report just who constitutes the "Scientific Community."

-Recommendations:

We concur with most of these recommendations and would suggest that they are, in most cases, current policy. Comprehensive Planning has recently hired a new Management Analyst. One of his tasks is to coordinate and track all grants and research projects. He will also collate all research documents. It is worth noting that Comprehensive Planning views these projects as task oriented, i.e., to fulfil a specific need, as opposed to a more general research objective. We use the information created and then move on. Therefore, not tracking a project that is no longer useful or critical for whatever reason is not something that we view as a significant shortcoming. In regard to the recommendation for a regular meeting to provide updates, we do just that through the regular meetings of the Air Quality Planning Committee. Our experience tells us that the many jurisdictions and publics that attend these meetings do not appear to be overly concerned about the status of our field studies, unless it is a significant factor to a SIP issue that affects them.

-Stationary Sources

New Source Review:

Generally, we concur with the points and recommendations made for the Emissions Reduction Credit Program. We believe that conducting the small source ERC program in a manner consistent with federal law would make it more credible and effective. We would note, however, that the current program has in fact resulted in the paving of a significant amount of unpaved roads in the Las Vegas Valley, with a concomitant reduction in PM10 from this category. It has also allowed the Air Quality Division to meet the demand from area sources for ERCs that would not otherwise exist in the Las Vegas Valley. We believe that by restricting interpollutant trading to PM10 and PM10 precursors, and operating the program in a manner more closely reflecting the federal offset program for major sources, the program could be improved and maintained.

Area Sources:

The language in the report concerning the proposed dust control rules is a bit dated, which is understandable given the fluid nature of the rule development process. We have enclosed copies of the current versions of Rules 90-94. These rules address all major sources of dust in the valley, including construction dust and disturbed vacant land. They follow the basic intent of the rules

EPA has approved for the Maricopa County Serious Area PM10 SIP. We understand the comments on the test methods and share the concerns . However, it should be noted that it is the EPA who is insisting that these test methods be included. Recently, the EPA has asked that we consider leaving room in the rules to insert new test methods as they become available, which we will do.

Additionally, we understand the concern regarding the applicability of the rules, particularly the disturbed vacant land rule. Between the concerns of the industry stake holders that all sources of dust be controlled and what the SIP has to include to meet the requirements for Best Management Practices and Most Stringent Measures, we see a minimal potential to draft rules that focus the applicability to specific geographic regions of the valley. We will do that on a more limited basis in developing the enforcement protocols that the AQD will utilize in implementing the rules. Further, it should be noted that all construction dust rules have been integrated into Draft Rule 94.

-Potential Additional Off Road Control Measures for On- and Off-Road Mobile Sources

We appreciate the effort that went into this section and the difficulty in trying to accurately assess control measures. If we had been consulted, we would have recommended a significantly different approach. Specifically, this section attempts to deal with sources of emissions that will most significantly affect ozone levels, which is likely to be a nonattainment pollutant in the Las Vegas Valley in the near future (we already know that we can demonstrate attainment of both the CO and PM10 standard without *any* of the control measures discussed in this section). The discussion would have been more useful if it had addressed the issue by first determining if the control measures that will be in place in the next five to six years in conjunction with whatever is already in place will be enough to demonstrate attainment. The rationale behind this approach is reflective of the experience we have had in conducting discussions with the public and stakeholders on what needs to be done. From that experience, it is clear to us that, all rhetoric aside, only those programs that are necessary and essential for attainment and maintenance can be supported. If OBDII, cleaner fuel mandates, cleaner cars, alternative fuels, CATMATCH, BACT for VOC/NOx/HC, Vapor Recovery, Smog Check, etc. will not be enough, then it would have been appropriate to look at what else is needed and what the best choice of additional controls would be. The report does not focus the issue enough, essentially leaving it up to the readers to pick their own favorites, regardless of how significant the program will be in attaining the standard. We anticipate that this report will be used by various members of the community to advocate their own programs, without regard to the actual benefits. This will not represent progress in the discussion, which is what this task was designed to do.

-Measures Targeting Emissions from In Use Vehicles and Engines;(excluding TCMs)

We read this section with interest, since mobile source control measures would seem to be the key to addressing future air quality problems. We would disagree with the statements and analysis of centralized, loaded mode testing as a cost-effective control program. We believe this conclusion is somewhat dated, not reflecting the current direction of technological developments in this area.

Simply put, loaded mode testing will become a "white elephant" in the early part of the 21st century, existing only to serve the ever-decreasing older portion of the fleet.

To indicate otherwise, and in fact not give alternatives like On Board Diagnostics the emphasis it deserves, is to ignore the current state of the art. We would encourage the contractor to reconsider its conclusions on loaded mode testing within the context of the Las Vegas Valley in the 21st century. Additionally, the conclusions in other areas of the analysis could be more clearly stated. For instance, scrappage programs have limited benefits at very high costs with complex documentation and tracking issues. For the suggested diesel controls, a plain English version of the conclusions would be that controls implemented only in Clark County will have higher costs and lower effectiveness if the rest of the state and country are not required to do the same thing.

In regard to the snap idle test (SAE J1667), this discussion also needs to be clarified to more accurately assess the situation. Specifically, it should be noted that tuning a diesel to pass this test may in fact increase emissions of other pollutants. Additionally, this is an opacity test, which involves visible particles that are larger than PM-10. Again, passing the snap idle test does not necessarily mean that PM-10 emissions are in all cases being effectively reduced. Finally, it should be noted that J1667 is showing its age. Newer trucks are equipped with technologies that must be disconnected in order to run the test in strict adherence to the protocol, which can void warranties and negatively affect the performance and emissions of the vehicle.

The retrofit discussion was interesting. We would have found it more useful if the costs and benefits of these programs had been compared to the costs and benefits of the extremely low sulfur diesel levels and 0.01 g/bhp PM emissions limit for Heavy Duty Diesels proposed by the EPA and the Clinton administration, starting in 2007. We would have liked to have seen a more thorough discussion of how to create financial incentives or tax breaks that could be used to facilitate the re-powering and retrofitting of diesel engines.

-Fuels:

Comments that we have made in the other sections are applicable here. Again, we would have liked to have seen an analysis of the cumulative benefits of the Tier II fuel and tailpipe standards as well as the proposed extremely low sulfur diesel and Heavy Duty Diesel emission standards proposed by the EPA in May of this year as the starting point of the discussion of what additionally needs to be done in this area. We believe these programs will have the greatest emission reductions at the least cost and that, by comparison, the other programs will fall short.

Conclusions:

We agree with the statement on page 81 in the second paragraph that the control measures discussed should be considered only if the need for such reductions can be demonstrated once the reductions achievable from area sources have been taken into account. This is an extremely valid

and critical conclusion and deserves to be emphasized more throughout the report and in this section. Doing so will minimize the potential for each stakeholder to continue to advocate for programs that might have some potential effectiveness, but that cannot be justified as necessary for attainment. We disagree with the conclusion on loaded mode testing. Given the increasing importance of OBDII, Tier II and other mobile source programs that will come on line in the next five to seven years, we believe that it would a poor investment to transition to a loaded mode testing system as an interim measure. Again, within the context of attainment for CO and PM10, we can demonstrate that we can meet both standards without a loaded mode test.

Task 3 Report: Current and Future Funding Requirements for Air Quality Programs in Clark County

Generally, we concur with the discussion in this section. From our review of the existing funding structure, we believe that there is a significant amount of revenue that could be realized from adjusting the AQD permit fees. Specifically, the Title V fees appear to be at the federal minimum, with a CPI adjustment factored in annually. Raising this per-ton fee to be more in line with neighboring states would realize a significant revenue increase. Additionally, the permit filing and review fees are low. Setting a reasonable filing fee designed to offset administrative and initial review costs, then setting a fee based on actual time spent reviewing applications multiplied by a Board approved hourly costs would also increase revenues. Finally, some increase in the Dust permit fees is justifiable, given the impending increase in work load in this area.

The major point in this area is that in order to successfully rectify all of the compensation, training, support and resource issues, significant increases in funding over and above what is currently available will be required. This is a key point that cannot be overemphasized.

Task 4 Report: Governmental Roles and Responsibilities

-Results of the Stakeholders Interviews:

We noted that the city staff interviewed felt they had " ...little say in current air pollution planning as the County tended to dominate the meetings." Our view would be somewhat different. The staff of Comprehensive Planning spends inordinate amounts of time and energy in attempting to get all of the Stakeholders involved and cooperating. The planning meetings are typically attended by public agency representatives who work at subordinate levels in their organizations. The only management level personnel typically present are from the AQD and Comp. Planning. Rather than dominating the meetings, it would be more accurate to say that the air agencies are the only entities who actually elect to speak and who attend with personnel who are in any position to make decisions. The cities and the other entities, for whatever reason, tend to be silent and uninvolved. We repeatedly hear how many stakeholders feel "left out". It is our observation that many of those same stakeholders are not willing to invest themselves or their agencies/organizations in doing the

difficult work of completing a SIP and articulating the needs of the agency that they represent. That is their responsibility and it is not an accurate depiction of reality to assign the two agencies primarily involved in this issue any kind of ownership over the "feelings" of others who criticize outcomes and processes, yet knowingly elect not to be involved on a regular basis.

Comprehensive Planning has always taken the position that all ideas are welcome and we have noted a lack of willingness of the cities to "dig in" and do the hard work that is part of an effective SIP and Rule Development process. Agency coordination is also an issue that you have properly noted. What should be clarified is the fact that Comprehensive Planning is reliant upon all of those same agencies for data and program commitments that are essential to the SIP process and for which, in many cases, they have been tardy or recalcitrant in bringing forth. Cooperation has increased as a function of both the SIP deadlines and the potential nearness of federal penalties. To the extent that this process has been successful, it is largely a function of the tenacity of the planning staff in keeping the issues and requests in front of these agencies. In fairness, we believe the report should recognize that fact.

We would point out that by integrating the air quality agency structure, which we support in concept, you do not necessarily or automatically change the institutional mind set of the many local, state and federal agencies that must become more cooperative if we are to be successful. The performance and cooperation of allied agencies, or lack thereof, in providing accurate and timely information to the air agencies is a significant issue that we believe was not addressed adequately by Environ.

Increasing the Role of the State Agencies:

We believe that this is an area where perhaps the experience of the past interferes with the understanding of the present. We support the State of Nevada and its efforts in support of our SIPs. They are doing everything necessary to fulfill the needs of the SIP. They are currently adopting OBDII regulations in support of the CO SIP. We worked with them to secure funding, via SB432, to improve the Roadside Diesel Program, which they have done. They have conducted Remote Sensing programs on a regular basis and effectively manage the Smog Check Program. NDEP is present and involved in all discussions with the EPA. We regularly communicate with the NDEP on the status of the SIPs. We attend their stakeholder meetings and take an active role in explaining the local issues related to the State's proposals. We do not believe that we should assume their responsibilities (i.e., managing Smog Check), nor do we believe that it is practical or necessary for them to assume a greater role in the development of SIPs although the need for enhanced multi-agency communication and collaboration is evident. Currently, the Bureau of Air Quality at the State of Nevada has a staff of approximately 30. It is not equipped to deal with the programmatic burdens of Clark County, nor would it be a simple or easy task to do so, despite what the report indicates. Attracting and retaining experienced staff is a serious challenge to all agencies in Nevada, and to augment the State's program with oversight personnel would be extremely difficult. It also would seem to us to be unnecessary.

Although California has a large and sometimes effective state program, one could argue that this comes at the expense of the local role and that there really are two EPAs in California. We would suggest that the need for a strong state agency in California is a function of having 30+ million people occupying a state with air quality problems that are prevalent throughout its borders. This is not analogous to Nevada. What we need is a continued commitment from all entities to communicate regularly and support one another's efforts. Within the context of the air agencies, this is happening; it will continue and this should be recognized as a very positive outcome of the efforts of the Federal, State and local staffs and their management. The real evolution of roles needs to occur outside the air quality agency context. There are a large number of federal, state and local entities that remain separated from the SIP process.

Adequacy of the Coordination Between Air Quality and Transportation/Land Use Agencies

The report attempts to compare the Clark County air quality programs to other areas of the country with successful programs. In order to be consistent and to look at this issue more objectively, it would have been useful to compare how and where Clark County invests its funds in transportation to areas with unresolved air issues, like the South Coast for instance, and also to areas where transportation/land use agencies have played a significant role in attaining an air quality standard. Portland is typically used as an example of the latter.

Potential Barriers to the Implementation of the Air Quality Program

Generally, this whole section was a recounting of the opinions of many without any apparent sifting of truth. Its usefulness, in our opinion, was therefore limited, except perhaps to set up the discussion of effective programs. The selection of the four agencies could be questioned as well. Of those four, how many have a desert that is under development, a stationary source inventory that cannot be used effectively as a source of emission reductions for attainment purposes, have experienced the population growth of the Las Vegas Valley in the same compressed time frame and are not located in areas where geography, topography and meteorology aid significantly in dispersing pollution? Which of those areas have the quality of life comparable to Las Vegas, affordability of housing, short commute times, high transit use, the same mix of employment, etc., and which have viable, growing economies that the business sector continues to find attractive? We would suggest that all of these factors are part of the air quality issues here in Clark County and may not be analogous to any of the areas chosen. Finally, how long have these areas been nonattainment for their respective pollutants and how many iterations of SIPs did it take for them to successfully address the issue? The answers to these are known, and they are truly enlightening.

We would suggest that in this area, the experience of Clark County is analogous to almost the entire country, yet this point is overlooked in the report. Los Angeles has the largest local air agency in the world and has been struggling with air pollution since the late 1940's. They have a strong state agency and are in EPA Region IX. They are organized similarly to the structure you have outlined, have a committed board and the most stringent rules in the world. Yet, they remain

unsuccessful. The same is true for the Bay Area Air Quality Management District. We point this out only to underscore that lack of success in Clark County on air issues is partly due to the difficulty of the undertaking. We should not overlook this or suggest that this will not be the case when the local agencies reorganize. Experience proves otherwise.

-Agency and Special Interests

The issues with the EPA are significant and can be summarized as follows:

A. Region IX covers a wide area and it is not organized optimally to serve the many nonattainment areas within its jurisdiction. Staff in the Region are split many different ways at any given time. As a result, the needs of Nevada for quick and timely resolution of issues with EPA or for timely and thorough review of Draft Rules, Modeling Protocols and SIPs are too often unmet. The Region *must* staff itself adequately and reorganize so that each state has its own team that is involved closely at every juncture of the SIP process, with a manager who has discretionary authority. Again, to make the point, you do not fix *this* problem by integrating the two local agencies, yet this remains a critical issue.

B. As an agency, EPA is not focused on Western PM10 issues, nor are they ready to deal with issues related to quantifying the benefits of mobile source control measures that are currently in the Clark County CO SIP, focusing instead on issues like the next MOBILE model and east coast ozone issues. As a result, major control programs go uncredited in SIPs, EPA cannot give answers to critical questions and states are left to fend for themselves. This results in lost time, overly complicated control measures and development of less attractive/effective programs merely because EPA is in a position to quantify the benefits of one program but not the other. Additionally, we are forced to fund and develop expensive and time-consuming research projects to quantify to both our and the EPA's satisfaction, sources of emissions that are difficult to accurately assess. This should already be done - by the EPA. As a Region, there is not much the EPA can do to rectify this. However, to fully address all of the problems with SIP/Program Development, this issue must be dealt with.

Results of the Interviews With Effective Agencies:

We appreciate this discussion and agree with the majority of its content. We also appreciate that the time constraints that Environ operated under precluded it from "living" with the air agencies over that last 120 days. To have done so would have been useful and enlightening. Much of what has been pointed out as elements of effective programs is in fact happening here in Clark County. Comprehensive Planning staff has initiated an effective communication structure with the regulated community, the EPA, the State and the public entities. We are disappointed only by the fact that the environmental community believes that we are not listening to them and that they have elected not to participate in the SIP process. Nevertheless, the leadership that has been demonstrated at all levels of county government has resulted in a) a revised CO SIP that the EPA is likely to accept and approve, b) a set of PM10 rules more stringent than any in the country that were

developed through an intensive stakeholder process open to any and all, and c) an unprecedented level of awareness and involvement by the elected officials in air quality issues.

Numerical Rankings of Clark County Air Program Characteristics

We believe that the approach taken here has been too coarse, and is both damaging and misleading. We believe that the Air Quality Division and the Air Quality Team of Comprehensive Planning should have been evaluated separately. We are aware of the allegations that have been made regarding the AQD and its management team. Verifying the extent to which those allegations are true is one of Environ's task that we would not question.

However, we are not aware of any credible source that would accurately criticize the fitness and effectiveness of the Air Quality Team and its manager. Conversely, the stakeholders are increasingly looking to the AQT for leadership, which it is effectively providing. That typically falls on the Assistant Planning Manager, who is a capable and experienced professional. The feedback we get from all sectors is positive. Although there is regular criticism of everything we do, to the extent that these issues have the potential to be resolved successfully, it is due in large part to the efforts of this dedicated team of professionals, who labor under extremely difficult circumstances. It would be our position that the planners are adequately trained, compensated, supported by the Board of County Commissioners and effectively managed at the Team and Department level and that it is unfair and inaccurate to indicate otherwise.

Recommended Organizational Changes

-Recommendation 1:

The Board of County Commissioners is in the process of considering an alternative structure. We would suggest that it might be useful to have the General Manager of the RTC sit on the Air Board as an ex-officio member and the Executive Officer of the Air Quality organization to sit on the RTC board in the same capacity.

Recommendation 2:

Again, we would question the validity of the statement of management effectiveness within the context of the Air Quality Team. Clark County and the local entities are working on an agency structure that is similar to the Environ recommendation. We would reiterate our concern that an agency of 100+ individuals will need more funding than currently is available. We would question the Federal liaison position, believing that should be a function of the Executive Officer and his/her Deputy. We concur on the outreach recommendation.

Recommendation 3:

We have no comments on this recommendation.

Program Funding:

We generally concur. We have commented on the areas where we believe there are reliable, justifiable revenue sources. We would agree that the increase is in the upper range of 20% over what funding exists today.

Staff Support:

We concur. We would only add that all four areas identified in the report are key, and their importance cannot be overemphasized.

Role of the State of Nevada:

We disagree for the reasons noted in our comments. We would reiterate that it is highly unlikely, and unnecessary, that the State of Nevada could attract and retain highly qualified professionals to provide program oversight in Clark County within any reasonable time frame. The recommendation on the State Environmental Commission approving the SIPs follows the California model and we would again raise the issue that in California, the role of most local agencies is greatly reduced and the net effect is that there are two EPAs in the state, each with separate standards and Clean Air Acts that they enforce. We believe that most technical support on SIP issues is properly the role of the EPA, but we remain skeptical that this issue will ever be successfully addressed. NDEP and DMV are in fact working closely on the IM program and that should be recognized. We would suggest that the needs of the SIP for attainment should continue to define the stringency and other program elements of the Smog Check, as defined locally in conjunction with the cooperation of the NDEP and the DMV.

Relations with the U.S. E.P.A.

We would concur with the recommendation on continuing the meetings with the EPA. Since we initiated those meetings, we obviously see the value. We believe that we have a reasonably good working relationship with the Region. Again, timely and consistent answers are what is needed from the Region and, as noted, that is largely a function of having adequate staff resources and management at the Region.

Public Outreach

We would disagree with the first statement in this section. Although Comprehensive Planning regularly hears complaints from the public regarding their dissatisfaction with the consultation process and their lack of access and involvement, we would note that our SIP process is more than typical of the areas that you have deemed effective; and it would appear to us that this same public the report refers to is unwilling to sit down with the regulated community, whom they apparently view as special interest adversaries, and do the work necessary to be involved and heard. We will

continue to provide the opportunities for involvement and will look for developing these further.

With regard to outreach, an agency can never do enough. Having said that, it should be noted that Comprehensive Planning makes an average of four presentations a month to various groups. For example, we recently made a presentation to a group of approximately 150 seniors at Sun City West. Their views and level of support on the issue were educational. This is not anomalous for us. The EMPACT website is up and running and is improving regularly, with real time air quality information available. We will continue to seek opportunities to interact and educate.

Finally, the report involves a lot of discussion about what an agency needs to be effective. The key, which should have been emphasized more, is knowledgeable, experienced and dedicated staff that are competently managed. Changing structure, adding funds or giving the state agencies a larger role will all be for naught if this central issue is not addressed comprehensively.

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Appendix G

ENVIRON Presentation to LCB Subcommittee on Air Quality Programs in Clark County, February 14, 2000

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Presentation to the Legislative Subcommittee on Air Quality Programs in Clark County

To Conduct a Study and Prepare a Report of Air Quality Programs in Clark County, Nevada, Pursuant to SB 432

Presented by

David Souten

ENVIRON International Corporation

February 14, 2000

Grant Sawyer State Office Building

Las Vegas, Nevada

ENVIRON

Today's Presentation

1. The Consulting Team

2. Study Objectives and Approach

3. Current Status

4. Schedule

5. Q/A Discussion

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The Proposed Study Team

- ENVIRON International Corporation
- Sierra Research, Inc.
- David Calkins
- William Sylte
- Barbara Joy

Project Tasks

- Four (4) main tasks
- Report to Legislative Subcommittee and 71st Legislature

Task 1: Identification and Evaluation of Current Programs and Program Efficiency

- Air monitoring network
- Population, economic, transportation forecasts
- Future emissions levels
- Current and future emissions
- Effectiveness of current program in attaining standards

Task 2:
Identification of Additional Control Programs

Needed to attain and maintain standards?

Criteria in evaluation include:

- Emissions reductions
- Likely air quality effect
- Cost/cost effectiveness
- Implementation obstacles
- Time requirements
- Uncertainties
- Legal/regulatory authority

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Task 3:
Current and Future Funding Requirements

- What are comparable program costs elsewhere?
- Does resource allocation match the problems?
- Where might additional resources be obtained if needed?

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Task 4:
Development and Implementation Roles and Responsibilities

"Is there a better regulatory infrastructure than currently exists in Clark County to attain and maintain acceptable air quality?"

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Task 5:
Report to Legislative Subcommittee and 71st Legislature

Status

- Started January 15, 2000
- Have begun to meet with stakeholder agencies (U.S. EPA and Clark County Department of Comprehensive Planning thus far)
- Have invited comments from all known stakeholders
- Begun to acquire necessary technical information/data

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Schedule

- Tasks 1 and 2 Draft reports complete in April
- Tasks 3 and 4 Draft reports complete in May
- Overall Draft report complete in June
- Overall Final Report to Legislative Subcommittee in September, 2000
- Presentations to 71st Session of Legislature and subcommittees as needed

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Discussion Overheads

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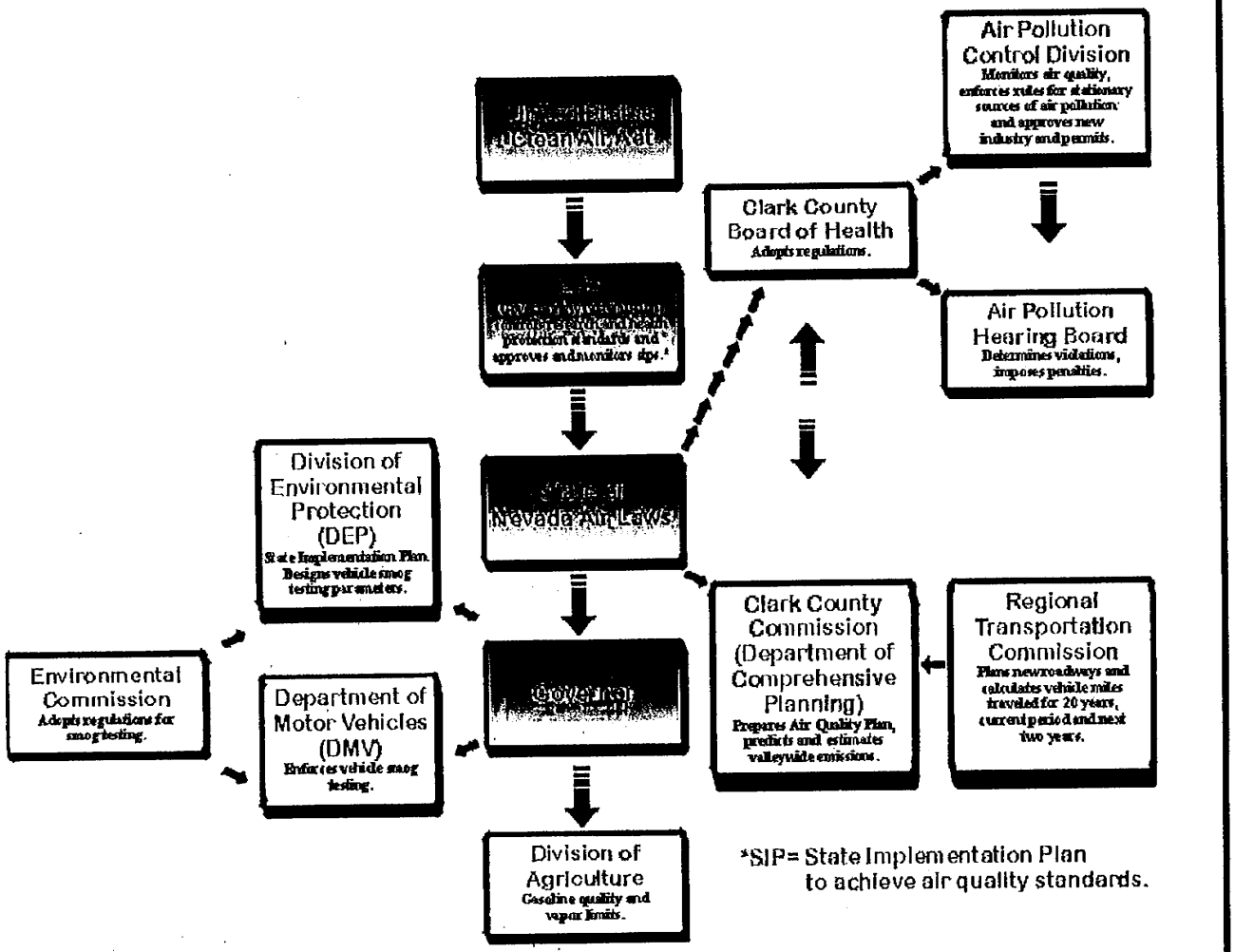
Institutional Relationships



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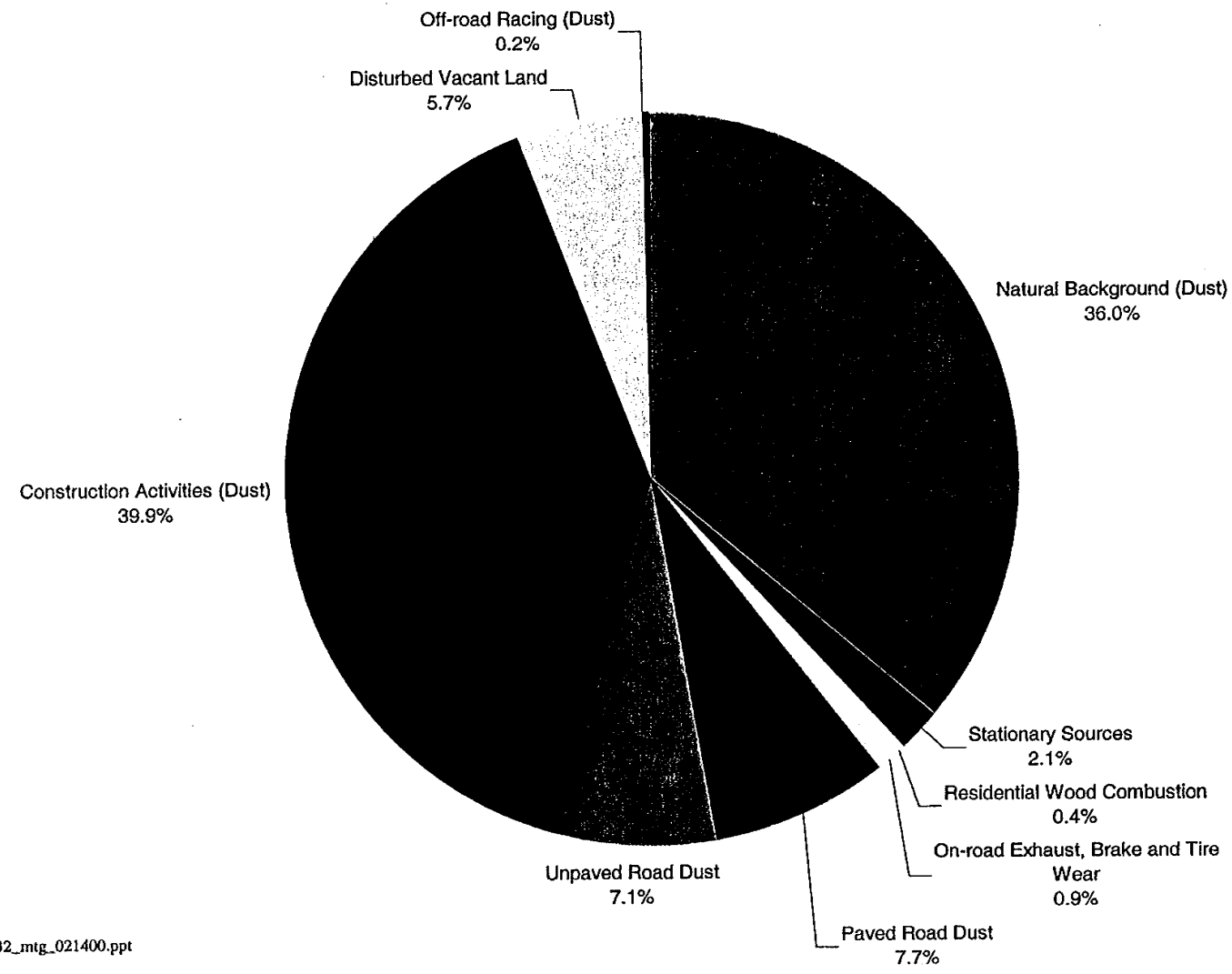
Annual Valley-wide PM10 Emission Inventory for (87,261 Tons Per Year)



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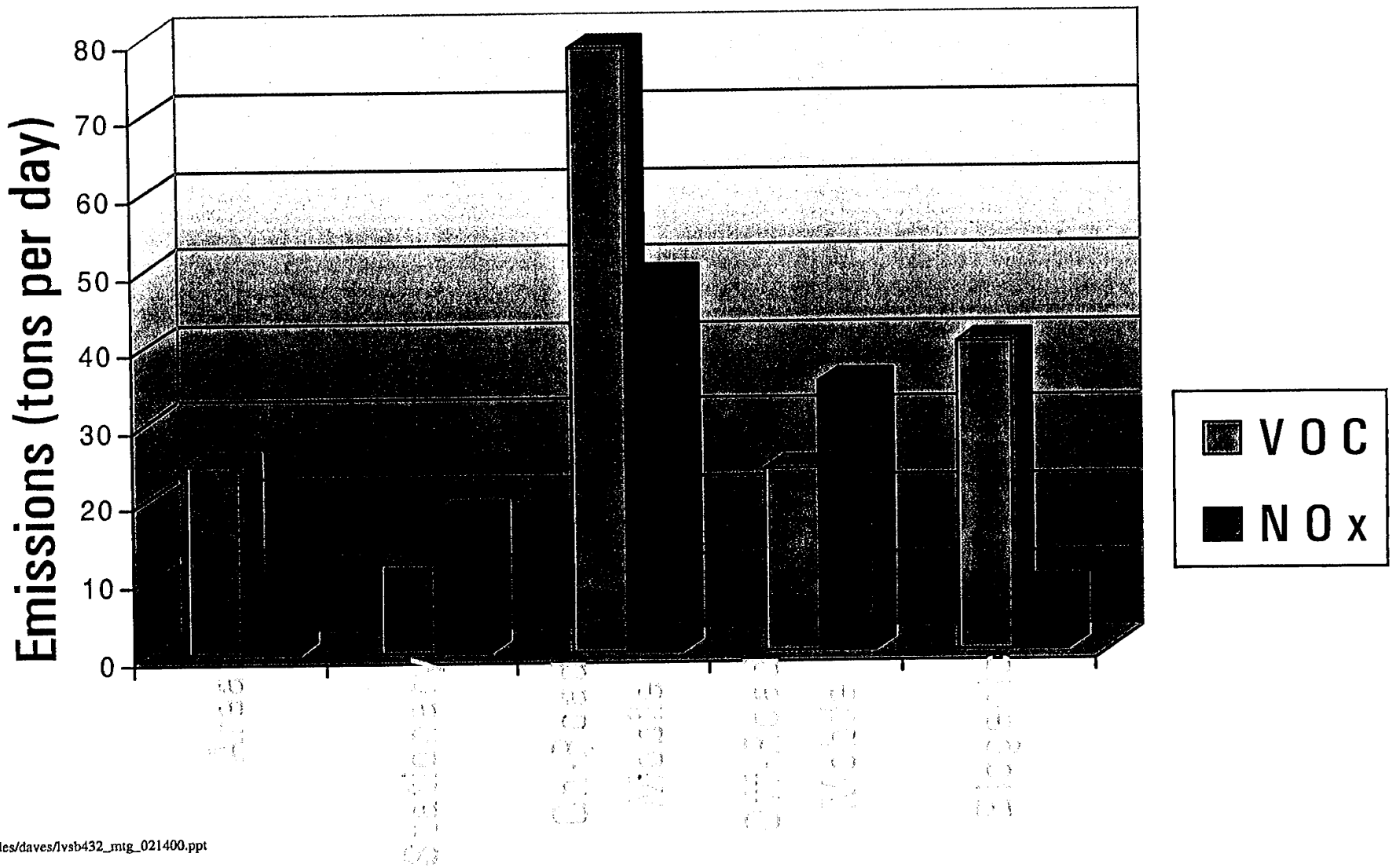
Source Categories of Ozone Precursors



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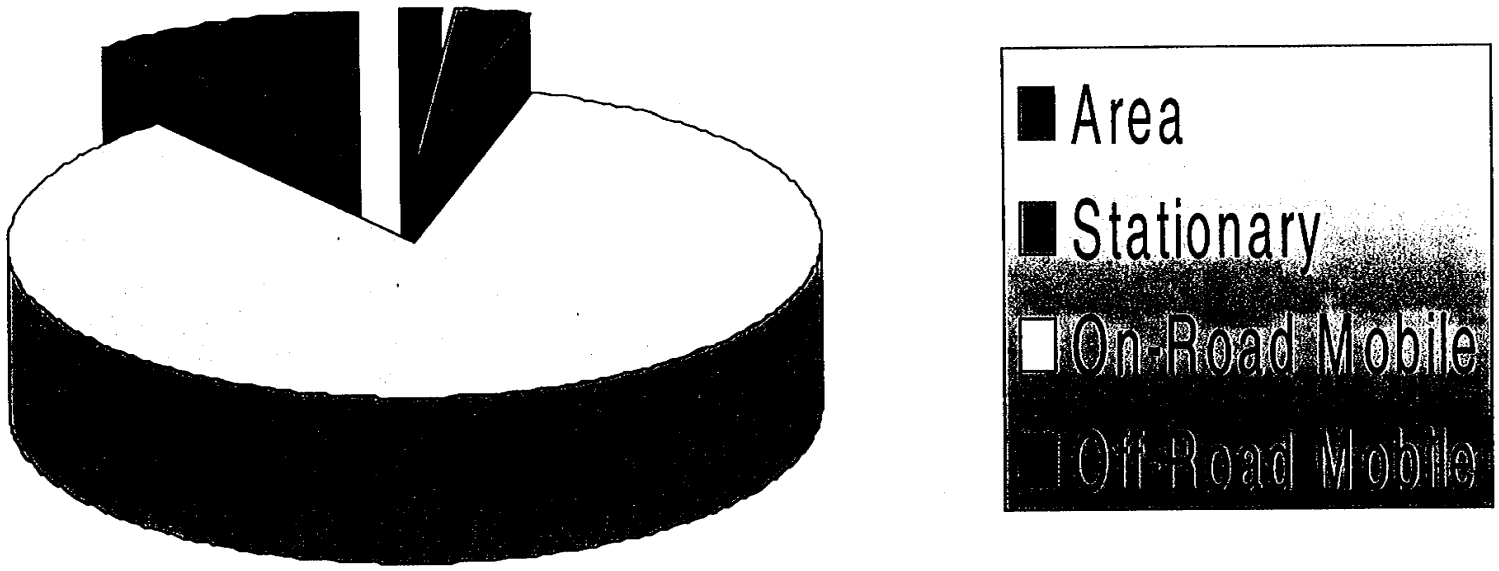
Source Categories of CO



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Appendix H

ENVIRON Presentation to LCB Subcommittee on Air Quality Programs in Clark County, June 5, 2000

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Presentation to the Legislative Subcommittee on Air Quality Programs in Clark County

To Conduct a Study and Prepare a Report of Air Quality Programs in Clark County, Nevada, Pursuant to SB 432

Presented by

David Souten

ENVIRON International Corporation

June 5, 2000

Grant Sawyer State Office Building

Las Vegas, Nevada

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Study Objective -- Evaluate the Air Quality Programs in Clark County and Make Recommendations if Changes are Needed

- What is the current state of the air quality, information availability, regulations, and overall operation of various agencies with responsibilities related to air pollution?

- What does the future look like, based on current information?

- What types of controls or other activities might serve the citizens through cleaner air quality?

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Study Objective -- Evaluate the Air Quality Programs in Clark County and Make Recommendations if Changes are Needed

(concluded)

- Are the air pollution programs adequately funded to do the job? If more resources are needed, are there revenue sources that are currently underutilized?

- Are the right agencies doing the right things? Is there a better way to manage the air pollution solutions in Clark County?

Who Carried Out the Study?

ENVIRON International Corp., Sierra Research Corp., and several key individual consultants.

Team Experience – U.S. EPA Region 9 (San Francisco); California Air Resources Board (Deputy Executive Officer); California Air Pollution Control District; U.S. Navy Engineering; extensive consulting experience; total of about 120 man-years of air pollution experience

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Where Are We At in The Study?

- Four draft reports have been released
- Executive summary of those, including specific recommendations to the Legislative Subcommittee, will be submitted at end of June
- Work will be finalized after comments received from the Subcommittee (summer/early Fall)

How Was Work Carried Out?

- Extensive review of past reports
- Personal interviews with large number of persons in agencies, public office, private sector, and environmental advocacy
- Comparisons made to "successful" programs elsewhere in U.S.

How Was Work Carried Out?

(concluded)

- Considerable experience of study team members brought to bear on issues
- Technical re-analyses of key components of air pollution studies or programs in Las Vegas area
- Solicitation of input through release of draft reports, comments by Advisory Committee members, and Legislative Subcommittee hearings comments

What Issues Did We Identify?

- Considerable inter and intra-agency conflict, especially within the Health District and between the Health District and Comprehensive Planning

- Roles, responsibility, and authority between these two agencies is not optimal

- RTC functions effectively in providing air pollution related transportation information to other regulatory agencies, and is a major stakeholder in State Implementation Plan submittal and approval by U.S. EPA

What Issues Did We Identify?

(continued)

- Air quality monitoring is improving, but additional improvements are needed
- Research products are generally good, but poorly coordinated among agencies, resulting in lack of long-term focus and efficient use of funds
- Enforcement of existing programs is improving but needs more improvement

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What Issues Did We Identify?

(continued)

- Emissions inventories, which are critical to proper decisionmaking, need to be much improved and organized

- Public outreach of air pollution program information needs to be improved

- The area is in non-attainment status for carbon monoxide and particulate matter (PM-10)

- Is very likely exceeding also the proposed standard for ozone

What Issues Did We Identify?

(continued)

- Air quality plans for CO, PM-10, and ozone need to be much better done that in the past
- Significant improvements have occurred in the ambient levels of CO
- Inadequate data to either support or dispel public perception of deteriorating visibility (increased regional haze).

What Issues Did We Identify?

(continued)

- Past population projections have been inconsistent and poorly reconciled. This had major impact on planning uncertainties. This seems to have been just recently resolved.

- Many regulations limiting air pollution emissions, in effect elsewhere in the U.S., could be effectively used in the Las Vegas region.

What Issues Did We Identify?

(concluded)

- Resources for air pollution management in Clark County are lower than desirable, especially when compared to agencies elsewhere with similar challenges

- Additional financial resource opportunities exist, in line with similar allocations in other U.S. areas

What Do We Recommend?

- Improved monitoring
- Improved emissions inventories
- Improved public accessibility to air pollution program data
- Better process for timely development of State Implementation Plans

What Do We Recommend?

(continued)

- Better, more comprehensive evaluation of the need for, and nature of, additional emissions reduction measures (through air quality management plans), especially for ozone, PM, and regional haze.

- Improved research coordination and resource use

- Better, more consistent enforcement of existing regulations

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What Do We Recommend?

(concluded)

- Retention of RTC as it is now constituted
- Elimination of Health District's Air Quality Division
- Elimination of Comprehensive Planning's air management functions
- Consolidation of air pollution programs though the formation of a single-purpose agency for air quality program management

Study Objectives

- Reduce the uncertainties surrounding air quality and air quality planning in Clark County
- Assess the need for and definition of future cost-effective air programs
- Based on need, develop recommendations for new/improved programs via legislation and/or regulation