Chapter 7

On-Going Activities

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7 ON-GOING ACTIVITIES

7.1 DISTRICT IMPROVEMENTS

A variety of on-going activities in the District will assist in bettering the understanding of the Valley's PM10 problem and meeting the federal PM10 standards. These on-going activities comprise improvements to selected areas in the emissions inventory, monitoring network, modeling, agricultural research, other special research projects, and a variety of work with organizations participating in voluntary efforts to improve air quality.

7.1.1 Emissions Inventory

Improving the emissions inventory is an on-going process. The District attempts to update point sources and 25% of the area sources each year. In addition, the District examines spatial surrogates and updates growth and control factors as needed. Occasionally, the District does original research in developing new emission factors for use within the EI. Over the next two years, the District is scheduled to spend time and effort in the following areas of the EI:

1. Agricultural Burning
2. Orchard Heaters
3. Unspecified Agricultural Processing Losses
4. Civilian Aircraft
5. Weed Abatement
6. Natural Gas Combustion
7. Fugitive Landfill Gaseous Emissions
8. Fugitive Emissions from Leaf Blowers
9. Growth Factors Development
10. Control Factors Development

In addition to the categories listed above, the District has identified many other emissions inventory categories that require improvement. While these categories are important, the District will not commit to improving each item, but will update item(s) as time, resources, and priorities allow. The following is a partial list of emissions inventory categories that can be improved, refined, or further evaluated:

1. Ships, Trains, Planes, Other

- Size and chemical speciation profiles for ships, trains, planes, and other sources

2. Paved Road Dust

- Evaluate AP-42 emission estimation approaches against real-time based approaches developed by Desert Research Institute and the University of California, Riverside;

- Develop spatially allocated emissions that include road volumes; and
- Develop a more refined approach for growth of paved road dust emissions.

3. Unpaved Roads

- Collect vehicle miles traveled (VMT) Data from Cities and Counties;
- Collect VMT Data from Federal Agencies, such as, the Bureau of Land Management, the United States Forest Service, the Bureau of Indian Affairs, and the National Park Service;
- Collect mileage and VMT data from private entities regarding irrigation and oil fields;
- Refine VMT data from agricultural sources; and
- Refine unpaved road spatial allocation methods.

4. Agricultural Operations

- Continue improvements on harvest emission factors, particularly almonds;
- Associate land preparation emissions with environmental factors (humidity, soil moisture, soil type); and
- Refine methodologies for NOx and PM10 emissions from unspecified crop processing losses and unspecified product processing losses.

5. Woodstoves and Fireplaces

- Collect better information on when, where, and how much wood is burned; and
- Collect information about the types of stoves and fireplaces used.

6. Livestock

- Collect California PM data for dairies;
- Evaluate PM from non-cattle livestock sources;
- Collect speciated VOC data for dairies and other cattle;
- Evaluate VOC from non-cattle livestock; and
- Collect additional ammonia measurements for cattle and other livestock.

7. Construction

- Estimates are currently based on housing units or economic indicators; need to collect actual permit data to better evaluate activity levels for construction dust emissions.

8. Ammonia

- Provide graphic displays of ammonia emission estimates using CRPAQS PM10/PM2.5 data.

9. Internal Combustion (IC) Engines

- Estimate emissions from area source IC Engines.

10. Windblown Dust

- Estimate windblown dust emissions from open areas.
- Improve windblown dust emissions factors and emissions estimates. The current inventory for windblown dust is high considering the meteorology of the SJVAB.

11. Unpaved Traffic Areas

- Improve activity and emission factor data.
- Add data on industries currently not included.

The extent to which each of the above is evaluated could be affected by EPA changes to the federal PM10 standards and to associate guidance documents or the issuance of new guidance documents.

7.1.2 Monitoring Network

Currently, there are eleven PM2.5 Federal Reference Method (FRM) and fifteen PM10 Selective Size Inlet (SSI) stations located throughout the San Joaquin Valley. The District operates five PM2.5 and nine PM10 sites, and the remaining sites are operated by ARB.

EPA requires that ongoing analysis of PM10 data recorded throughout the network be conducted to determine if the monitoring schedule meets the minimum sampling frequency requirements of Title 40, Code of Federal Regulations, Part 58.13. By using an alternate 6-day schedule in Corcoran, the District's sampling frequency is every 3-days at that site. All other PM10 monitoring in the San Joaquin Valley is conducted on the sixth-day minimum schedule required by EPA and ARB. PM2.5 scheduling is varied according to season. The PM2.5 sampling frequency from April through September is every six days and increases to every third day for the months of October through March.

In an effort to gather real-time hourly data, the District operates a BAMS (Beta Attenuation Spectrometer) PM10 at Corcoran-Patterson, Bakersfield-Golden, and Tracy Airport plus PM2.5 BAMS at Bakersfield-Golden, Corcoran-Patterson, Tracy Airport and Clovis. The ARB also has BAM PM2.5 monitors at Bakersfield-California, Fresno-First, Modesto-14th Street, Stockton-Hazelton and Visalia-Church.

The data gathered by BAMS is being used to document diurnal variations in PM concentrations and to document PM10 and PM2.5 concentrations for Air Quality Index (AQI) reporting and forecasting. They are not being used to determine attainment of the PM standards. (Note: the PM10 BAMS is now an Equivalent Method sampler.)

Assembly Bill (AB) 841, Arambula was chaptered in October 2005 and amends California Health and Safety Code Section 40607 to require the installation of an additional PM monitoring station within the SJVAB. The bill requires the installation of a PM2.5 monitor on the West side of Fresno County. The station will also monitor for ozone and NOx. A site has not yet been determined.

On December 20, 2005, EPA proposed amendments to its monitoring requirements to support proposed changes to EPA's NAAQS for particle pollution. The District will modify its monitoring network as required by changes in approved federal policy.

7.1.3 Modeling Improvements

Modeling efforts will be improved by further application of CRPAQS modeling and modeling tool development. CRPAQS results will continue to improve our understanding of the factors and relationships affecting particulate chemistry, formation and deposition. Two major modeling efforts are in progress to evaluate CRPAQS episodes with advanced modeling techniques. Results of these efforts will require subsequent analysis to predict the effects of emissions reductions. The analysis will

evaluate emission levels that were occurring in the 1999 to 2001 period. The understanding gained from these analyses will allow refined predictions of the levels of particulates likely to form from predicted future emissions levels.

Chemical Mass Balance (CMB) modeling will improve as additional speciation profiles are developed or updated for different sources. Various state and regional studies provide occasional updates, which are incorporated by ARB subsequent to technical review and consideration. Continued refinement and evaluation of the connection between emission inventories and observed particulate concentrations will be an ongoing challenge for the District and ARB. Continued review is required to ensure that the relationships suggested by CMB are tested for validity and comprehensiveness. The process of CMB modeling is limited by the proper identification, availability, selection, and accuracy of appropriate contributing source profiles.

Additionally, secondary particulate formation is being evaluated with CRPAQS modeling. The final results of all of these studies are not yet available as of October 2005; however, these advanced models and modeling techniques are being tested to gain further understanding of the nitrate particulate formation parameters and dynamics. The *2003 PM10 Plan* relied upon evaluation of IMS95 nitrate analysis. This *2006 PM10 Plan* is based on CRPAQS data, an improved photochemical model (CMAQ), new information on emissions, and updated air quality data. ARB continues to evaluate CRPAQS episodes with advanced modeling to provide additional insight into the nitrate particulate relationships.

CRPAQS did not include deposition rate measurements to address particle size related deposition rates. Deposition rates are estimated at this time for current modeling techniques. Assessments of biogenic emissions, particulate formation mechanisms from biogenic aerosols, and rates for surface deposition removal of particulates by vegetation are poorly quantified at this time. These factors are generally considered to be more important for Eastern states, but evaluation of local contributions and removal rates must be better quantified to improve model performance for CMB and regional modeling. Federally funded research in the SJVAB or elsewhere may provide technical data to address this issue in the future.

7.2 AGRICULTURAL RESEARCH

The Agricultural Technical Advisory Committee, also known as the AgTech group, continues to provide a forum for the review of on-going and planned agricultural research at a local level. Created in 1999, the group is comprised of representatives from the District, California Air Resources Board, California Cotton Ginners and California Cotton Growers Associations, Nisei Farmers League, Almond Hullers and Processors Association, Natural Resources Conservation Services (NRCS), Environmental Protection Agency, and local farm bureaus. Since its inception, the group has grown to include participants from the California Department of Food and Agriculture, Western United Dairymen (WUD), JG Boswell, university researchers, and

many more. In 2002, the AgTech group created three subcommittees to better address specific issues of the agriculture industry: the Growers Subcommittee, the Almond Technical Subcommittee, and the Dairy Subcommittee.

The Growers Subcommittee, which is presided by a chairperson representing the agriculture industry, assists in the identification of conservation management practices for the nut trees, fruit trees, and row and field crops industries. The subcommittee compiled a list of CMPs (conservation management practices), which was used by the District to develop the agricultural CMP Program.

The Almond Technical Subcommittee is presided by a chairperson from the Air Quality Group (UC Davis and the Center for Irrigation Technology, CSU Fresno). The Air Quality Group cooperatively conducted a research study to monitor PM emissions from almond harvesting. The objectives include: (1) the development of improved PM10 emission factors that update the emission factor currently used by the District and (2) the evaluation of the current measurement method's sensitivity to determine the effectiveness of alternate almond harvesting practices in reducing PM10 emissions. During the 2004 almond harvest season, PM10 concentration measurements were collected at locations upwind and downwind of almond pick-up operations. Further PM10 measurements for sweeping operations in almond harvesting were made during the 2005 season, using methods that were improved as a result of findings from the 2004 study. PM10 2004 pick-up operation measurements and 2005 sweeping data may be combined to replace the current emission factor for almond harvesting operations, depending on analysis of data quality.

The Dairy Subcommittee, presided by a chairperson affiliated with the California Department of Food and Agriculture, focuses on air quality research needed by the dairy industry. The subcommittee also assisted the District in developing the CMPs for the CAFO component of the District's agricultural CMP program. In May 2003, the Dairy Subcommittee published a report entitled, "Air Emissions Action Plan for California Dairies." Originally a plan addressing only dairies in the San Joaquin Valley, the plan was modified to include all dairies in California. The plan contains proposed research objectives with short-term, mid-term and long-term goals, which will be refined over time. Plan objectives address ammonia, particulate matter, and reactive organic gas emissions from dairy farms and their processes.

In 2005, monthly meetings of the Ag Tech group provided a forum to researchers to discuss ongoing research regarding PM10 and their precursors in the form of VOC and ammonia. One such study is "Investigation of the Potential for the Electrostatic Control of Particulate Matter Emissions from Agricultural Tillage Equipment in the San Joaquin Valley." In April 2005, the Ag Tech Committee approved the public release of research results for the study, "Quantification of Gaseous Emissions from California Broiler Production Houses."

In 2002, there were only two ongoing projects related to PM10 and its precursors. Three years later, in 2005, the list of ongoing, planned, and recently completed projects has grown substantially, as shown in Table 7-1, and was compiled from ARB and District sources.

Table 7-1 Agricultural Research Summary [a]

Project Name/ Description	Key Project Goals	Principal Investigator and Staff; Affiliation	Funding Source and Amount	Completion Date
On-Field Research				
Improvement of PM10 emission factors for almonds	Refine existing almond harvest particulate matter emissions	R. Flocchini and C. Parnell; UC Davis and Texas A&M	Almond Board of California	June 2004
Improved Statewide Estimates of Ammonia Emissions from Native Soils in California	Develop California specific ammonia emission factors and modeling for native soils within California.	C. Krauter, C. Potter, and S. Klooster; CSU Fresno, NASA Ames, and CSU Monterey	ARB, $200,000	Dec. 2004
Monitoring of Ammonia Emissions from Crop Production with a Tunable Diode Laser	Evaluate the use of a TDL system for determination of ambient ammonia levels and ammonia emissions from specific agricultural operations.	C. Krauter, D. Goorahoo, B. Goodrich, and M. Beene; CSU Fresno	CSU Agricultural Research Initiative $296,000 ARI to match ARB and UniSearch funding	June 2005
Reducing Emissions of Volatile Organic Compounds from Agricultural Fumigation (Undergoing ARB review)	Provide information that can be used to determine if proposed methods to control VOC emissions are adequate to achieve the required reductions.	S. Yates, J. Gan, M. Majewski, D. Wang Q. Wang, and W. Zheng; UC Riverside	ARB $200,000	Dec. 2007
Investigation of Atmospheric Ozone Impacts of Selected Pesticides (Undergoing ARB review)	Develop methods for estimating and quantifying ozone impacts for selected pesticide compounds for which such estimates are not currently available	W. Carter, UC Riverside	ARB $100,000	Feb. 2006

Table 7-1 (continued)				
Project Name/ Description	**Key Project Goals**	**Principal Investigator and Staff; Affiliation**	**Funding Source and Amount**	**Completion Date**
Livestock Research				
Evaluating Full Dairy Reactive Organic Gas Emissions	Chemically speciate TOG samples collected at dairies. Attempt to develop emission factors for dairies and some individually tested dairy processes.	C. Krauter, D. Goorahoo, B. Goodrich, and M. Beene; CSU Fresno	ARB, SVJAPCD, Dairy CARES, CSU Foundation $100,000 from ARB $20,000 from other sources	Dec. 2004
Dairy Air Quality Monitoring of ROG and Ammonia in the Central Valley	Maintain staffing and supplies for field and laboratory work to continue the ARB funded ROG project until 2006.	C. Krauter, D. Goorahoo, B. Goodrich, and M. Beene; CSU Fresno	CSU Agricultural Research Initiative $208,000 ARI to match ARB and SJVAPCD	June 2006
Evaluating Dairy Ammonia, Methane and Hydrogen Sulfide Emissions using Tunable Diode Lasers	Develop real-time methods for evaluating process and time specific emission profiles for NH_3, CH_4, and H_2S at dairies.	D. Goorahoo, C. Krauter, B. Goodrich, and M. Beene; CSU Fresno	CSU Agricultural Research Initiative $98,000 ARI to match ARB and Boreal Lasers Funding	June 2006
Evaluating Dairy ROG Analytical Methods	Apply new sample collection and analytical methods to evaluate dairy reactive organic gas emissions	R. Flocchini, T. Cassel, and R. Higashi; UC Davis	USDA	On-going
Agricultural Sources of PM10 and Ozone Precursors	Compile PM10 and NH_3 emission factors. Measure concentrations of VOC relevant to O_3 formation upwind and downwind of dairies.	R. Flocchini, C. Parnell, and R. Higashi; UC Davis and Texas A&M	USDA $374,844	July 2005
Dairy Cow Emissions in an Environmental Chamber	Place cows into an environmentally controlled chamber and evaluate speciated TOG emissions emitted directly from cows and from fresh waste products.	F. Mitloehner, R. Flocchini, and J. Peters; UC Davis	USEPA California Dairy Research Foundation $75,000 EPA $65,000 CDRF	Dec. 2004

Table 7-1 (continued)

Project Name/ Description	Key Project Goals	Principal Investigator and Staff; Affiliation	Funding Source and Amount	Completion Date
Evaluation of Dairy Emission Mitigation Practices	Evaluate dairy PM10, PM2.5, VOC and ammonia emission mitigation practices for potential effectiveness. Includes lagoon and corral areas.	F. Mitloehner, R. Zhang, P. Robinson, and J. Fadel; UC Davis	Merced County via SWRCB $600,000	Dec. 2006
Measuring Broiler Emissions in Tunnel Ventilated Housing	Measure PM10, ammonia, and speciated TOG emissions emitted from a tunnel ventilated broiler house during various stages of bird growth.	M. Summers and D. Duke; CDFA and Foster Farms	California Poultry Federation $40,000	Sept. 2004
Evaluating Dairy Process Emissions Using Flux Chambers	Using environmental flux chambers at a working dairy, evaluate relative emission levels of individual process including lagoons flush lanes and corrals. The flux chamber is a plastic hemisphere about 2 feet in diameter that is placed over various locations at the dairy and emissions evaluated.	C. Schmidt, Environmental Consultant	ARB & SJVAPCD $50,000 ARB $50,000 SJVAPCD	Dec. 2004
Establishment of Testing Protocols for Manure Treatment	Compile a database of manure additives and commercial products claimed to mitigate NH_3 or VOC emissions. Investigate the mechanism for creating the reduction by each product. Evaluate multimedia effects of products on dairies. Develop a protocol to test the claims of reductions by the products.	D. Meyer, W. Powers, E. Tooman, and T. Cassel; UC Davis	SCAQMD	June 2004
Measurement of Organic Gases in Dairy Biogas Production Systems (Proposal)	Characterize gases produced in covered liquid dairy manure retention ponds and combusted in electrical generator engines. Quantify hydrocarbon emission rates from generator engine combusting the lagoon gases.	T. Casel, R. Higashi, and R. Flocchini; UC Davis	To be determined	TBD
Evaluation of Volatile Fatty Acids for Dairy Cattle Housed in an Environmental Chamber (Proposal).	Quantify the levels of volatile fatty acids produced by dairy cattle in an environmental chamber. Key compounds for identification include propionic, buteric, and acetic acids.	To Be Determined, Possibly Texas A&M	To be determined $10,000	TBD

Table 7-1 (continued)

Project Name/ Description	Key Project Goals	Principal Investigator and Staff; Affiliation	Funding Source and Amount	Completion Date
Development of an Improved Process-Based Ammonia Model for Agricultural Sources	Develop a process-based model of ammonia emissions from five types of animal feeding operations: dairy, beef, swine, chicken, and turkey.	G. Tonnessen, Z. Wang, R. Zhang, J. Fadel, G. Mansell, and J. Haasbeek; UC Riverside, UC Davis, and ENVIRON International Corporation		TBD
Dairy Operations: An evaluation and Comparison of Baseline and Potential Mitigation Practices for Emissions Reductions in the San Joaquin Valley (Undergoing ARB review)	Project is designed to obtain data needed to better estimate baseline dairy emissions and to estimate the emissions reductions achievable with available control technologies.	C. Krauter, D. Goorahoo, B. Goodrich, and M. Beene; CSU Fresno	ARB and possible matching funds from ARI $250,000 ARB $250,000 ARI (tentative)	June 2008
Covered Lagoon Digester Emission Measurements	Measurements of NH_3, methane, possibly VOCs at Castelanelli Dairy in Lodi, which has a covered lagoon digester installed.	Kurt Roos and Jack Martin; EPA	To be determined $40,000	TBD

[a] The list includes research projects that relate to PM precursors (NOx, VOC, NH3, SOx), although only NOx appears to significantly affect the attainment strategy. Source: San Joaquin Valley Ag Tech Group Meeting Notes (March 2004) and ARB's Summary of Current Agriculture Related Research Within California (November 29, 2004). For a listing of completed projects, consult ARB's Summary of Current Agriculture-Related Research Within California, (November 29, 2004).

7.3 SPECIAL STUDY STRATEGY

CRPAQS is a comprehensive public/private sector collaborative program whose goals are to provide an improved understanding of PM and visibility in central California and to provide decision-makers with the tools needed to identify equitable and efficient control methods. The study is intended to evaluate air quality with respect to the federal and State air quality standards for PM10 and PM2.5, some of which are consistently exceeded in central California.

A major field program was designed and undertaken to address fall and winter PM episodic conditions as well as annual average conditions. Input to the design of the field program was solicited from regulatory agencies, data analysts and modelers, and the research/contracting community. The objective of the field program was to obtain a documented data set with appropriate data qualification statements suitable for

characterizing the nature and causes of particulate concentrations and visibility impairment in central California to support modeling and data analysis activities.

The field program commenced in December 1999 and continued through February 2001. The monitoring consisted of 14 months of data collection throughout the San Joaquin Valley (SJV) and surrounding regions as well as intensive, shorter-term monitoring during fall and winter-like episodic conditions when PM10 and PM2.5 concentrations are highest. The program established an array of monitoring throughout the period, enhanced during summer months with a companion ozone study (CCOS) and considerably expanded during the fall and winter with intensive data gathering and monitoring operations.

Air quality sampling locations for the annual monitoring program built upon and took advantage of the extensive existing PM10 and PM2.5 monitoring networks established by the ARB and local air pollution control districts. More than 70 PM10 sites and 50 PM2.5 sites throughout California comprised this backbone network. Study enhancements to these networks included full scale “anchor” monitoring sites measuring gaseous and aerosol species through both filter-based and continuous species specific methods. In addition, “satellite” monitoring sites measured aerosol species using portable PM monitors and nephelometers. Surface and aloft meteorological measurements were collected utilizing a network of surface meteorological sites, radar profilers, and sodars. A special 100-meter tower collected data at several elevations on meteorological and air quality parameters.

The fall episodic program took place in October and November of 2000 in the central portion of the San Joaquin Valley. This monitoring window corresponds to periods of historically high PM10 concentrations that are dominated by geological material. Specific issues addressed in the fall monitoring program include identification of the sources of geological material and determination of the zone of influence of these sources. The fall measurement program included neighborhood scale saturation monitoring and measurement of organic species and particle morphology.

The winter episodic field study took place from December 2000 through February 2001. PM2.5 concentrations have been historically highest during the winter months, with secondary ammonium nitrate and carbonaceous material the dominant constituents. Specific issues addressed in the winter monitoring program included identification of the sources of carbonaceous material, determination of the limiting precursors for secondary PM species, surface and aloft transport and mixing mechanisms under low wind speed conditions, and the zone of influence of both primary and secondary sources of PM. The winter measurement program included an expanded set of anchor sites, and an enhanced upper-air monitoring network. On days forecasted to have the highest PM concentrations, additional special measurements were collected including organic species tracers, fog chemistry, time-of-flight mass spectrometry, and measurement of wet deposition. Special emphasis was placed on collection of continuous and species-specific particulate measurements to support both receptor and grid-based modeling approaches. Methods for collecting information on air quality aloft

included use of a 100-meter tower, an elevated site in the Sierra Nevada mountains, and a remotely piloted blimp, which was specially designed to fly under low visibility, stagnant conditions.

Documentation on the field study measurements can be found under “”Final and Summary Field Program Reports” at:

http://www.arb.ca.gov/airways/crpaqs/publications.htm

Descriptions of the monitoring site locations is provided at:

http://www.arb.ca.gov/airways/crpaqs/siteAtlas/siteatlas.htm

Subsequent to the field program, the data collected has been archived in a centralized comprehensive database containing over 152 million records. The database can be accessed at:

http://www.arb.ca.gov/airways/Datamaintenance/default.asp

In addition, extensive analysis and modeling of the data collected during the field program has been carried out. The data analysis questions being addressed include assessment of the accuracy and validity of monitoring methods, characterization of the spatial and temporal variations in PM and visibility, understanding of the meteorological conditions associated with PM10 and PM2.5 concentrations, evaluation of the chemistry of secondary PM formation, and assessment of the sources contributing to episodic and annual average PM. Over 30 presentations have been given at national air quality conferences on the results of the CRPAQS data analysis. These conference presentations can be found at:

http://www.arb.ca.gov/airways/crpaqs/publications.htm

under ”Conferences and Presentations.” Over 40 articles have also been published in peer-reviewed journals such as Atmospheric Environment, Environmental Science and Technology, and the Journal of the Air and Waste Management Association. Final data analysis reports will be available in late 2005.

Currently, air quality and meteorological modeling of the winter episodic period is being conducted. Several different modeling methods are being employed to provide complementary approaches to understanding the problem. Modeling efforts will continue through 2006.

CRPAQS research published in the peer-reviewed literature and in proceedings from professional meetings supports the findings of the *2003 PM10 Plan* and the *2006 PM10 Plan* that control of ammonia emissions is not effective for reducing ambient levels of particulate ammonium nitrate in the SJVAB. Appendix D provides an annotated and current bibliography of key CRPAQS research publications with high relevance for PM10 in the SJVAB, as well as a list of presentations of key CRPAQS research at professional meetings. The most important of the papers from Appendix D that address the ammonium nitrate issue include the following:

- Kleeman, Ying and Kaduwela (2005) demonstrated using a UC Davis photochemical model that a 50% reduction in ammonia emissions lowered ammonium nitrate levels by only about 10%, the smallest level of the precursors studied.
- Herner, Aw, Gao, Chang and Kleeman (2005) studied measured airborne particulate matter in the San Joaquin Valley and determined that the majority of fine particle mass during the December 2000 to January 2001 event in Bakersfield was ammonium nitrate driven by an excess of gas phase ammonia (and by inference, ammonia emissions controls would not be directly coupled with reductions in particulate nitrate due the presence of excess gas phase ammonia).
- Held, Ying, Kaduwela, and Kleeman (2004) found that the UC Davis photochemical model referred to above adequately captures the fundamental transport and chemical reactivity of air pollutants in the domain of the IMS95 study during a typical severe pollution episode, and the UC Davis model can be used to explore control scenarios designed to improve air quality in the SJ Valley.
- Pun and Signeur (2001) used a box model to show that nitric acid, rather than ammonia, was the limiting reagent in the formation of nitrate particulate matter in the San Joaquin Valley (using the 1995 Integrated Monitoring Study data as a basis).
- Kumar et al (1998) showed that 150 samples that were above the detection limit for ammonia and nitric acid concentrations had the following characteristics: 93 percent of the samples were ammonia rich; 4 percent had comparable ammonia and nitric acid levels; and 3 percent of the samples were nitric acid rich;
- Blanchard et al. (2000) found that no ammonia limitation existed during the 1995 Integrated Monitoring Study.
- Lurman et al. (2004) found that nitrate formation in the San Joaquin Valley Air Basin (SJVAB) is not likely to be limited by ammonia availability.

The PM10 Plan's strategy to control ammonium nitrate levels in the SJVAB relies on reductions of NOx emissions. The preponderance of evidence from numerous studies continues to indicate that a strategy of controlling NOx emissions is the most effective way to reduce ambient levels of ammonium nitrate in the SJVAB.

7.4 OPERATION CLEAN AIR

A number of political and business leaders from around the SJVAB have come together to form "Operation Clean Air." The purpose of the group is "to create a 5-year action plan that will clean our air and promote prosperity in the San Joaquin Valley." The centerpiece of the effort is the development of a Clean Air Action Plan (CAAP) for the SJVAB. The CAAP includes voluntary emission reduction strategies that can be implemented by governmental agencies, private businesses, and individuals. One of the more innovative measures in the CAAP is the establishment of an Air Quality Empowerment Zone that will provide tax credits for businesses and individuals that implement programs to reduce emissions in the San Joaquin Valley. The emission

reduction measures included in the CAAP will be in addition to the traditional regulatory programs included in the District's air quality plans. The CAAP also includes a component outlining resources that will be needed to achieve the reductions outlined in the CAAP.

7.5 ENVIRONMENTAL QUALITY INCENTIVES PROGRAM

The Environmental Quality Incentives Program (EQIP) was reauthorized in the Farm Security and Rural Investment Act of 2002 (Farm Bill) to provide a voluntary conservation program for farmers and ranchers that promotes agriculture production and environmental quality as compatible national goals. EQIP offers financial and technical help to assist eligible participants install or implement structural and management practices on eligible agriculture lands. Incentives for measures that benefit air quality, which started in 1998, play an increased role in this program.

EQIP contracts provide incentive payments and cost-share to implement conservation practices on growers' lands. Persons who are engaged in livestock or agriculture production on eligible land may participate in the EQIP program. EQIP activities are carried out according to an environmental quality incentives program plan of operations developed in conjunction with the producer that identifies the appropriate conservation practice(s) to address the resource concerns. The practices are subject to National Resource Conservation Services (NRCS) technical standards adapted for local conditions. The local conservation district approves the plan.

The Air Quality enhancement practices accomplishments to date include:

Total cost share dollars allocated	$18.8 million
Number of participants	2500
Cumulative miles with dust suppressant	1600
Cumulative tons of P.M.-10 reduced	4700
Cumulative acres of chipped prunings	111,000
Cumulative Tons of P.M.-10 reduced	1350
Cumulative tons of NOx and VOC's reduced	2151
Cumulative acres with Conservation Tillage	47,500
Cumulative P.M.-10 reduction with C/T	2500
Number of diesel engines replaced	346
Tons of NOx and VOC reductions from engines	737

7.6 SUSTAINABLE INCENTIVES

In an effort to bring about early air quality improvements for all pollutants of concern in the Valley, the District is considering a variety of new concepts. One program concept that would promote the implementation of air pollution reducing practices is to enable sources, including exempt sources, to use sustainable incentives. Sustainable

incentives are financial measures, programs, and/or prohibitory rule alternative compliance plans that provide an economic mechanism to fund pollution reduction measures. Sustainable incentives may be in the form of private industry and/or foundation programs, federal and/or state government grants, tax credits, prohibitory rule incentives, and other programs.

Sustainable incentives are based in part upon the highly successful initiatives implemented by the United States Department of Agriculture, Natural Resource Conservation Service, through the federal farm bill's "Environmental Quality Incentives Program," the State's highly successful Carl Moyer Program, and the District's REMOVE Program, and other economic incentive and alternative compliance plan programs that offset the implementation cost for pollution reduction measures. This is accomplished within the framework of a private industry/public/agency partnership. The sustainable incentives concept revolves around a market based approach to pollution reduction utilizing measures that are economically sound and backed up by scientific research.

Sustainable incentives are market based concepts that require (1) local Districts, the Air Resource Board and EPA to assist local municipalities and public agencies in acquiring federal funding for the implementation of emission reduction measures (as opposed to only mandating requirements); (2) the acceptance of proposals from private industry that generate equivalent emissions reductions identified in prohibitory rules, but are less costly, and (3) promote the acquisition of federal, State, and/or other funding to continue and expand incentive programs such as EQIP, Carl Moyer, and acquire additional funds for the local transportation agencies and local communities, to offset mitigation cost needs. Sustainable incentives could obtain reductions either through contributing to programs such as the federal farm bill's Environmental Quality Incentives Program, on-site reductions or reductions generated within the geographic region of the local District.

For example, the District developed a restructured Rule 4694 (Control of Emissions from Wine Fermentation) to incorporate a market-based approach that achieves emission reductions consistent with planning needs, expedites obtaining emission reductions from wine fermentation, and provides the wine industry time to develop expertise in controlling fermentation emissions without affecting product quality. The restructured rule, which was approved by the District Governing Board in December 2005, requires operators of applicable wineries to reduce or mitigate 35% of their total wine fermentation emissions.

Operators may achieve the 35% reduction in facility-wide fermentation emissions by any combination of the following means:

- Installing and operating VOC control systems on fermenters;
- Obtaining surplus emission reductions from other emission sources; and
- Paying into an Air Quality Impact Mitigation fund that would be administered by the District to obtain surplus emission reductions from other sources within the District.

District staff believes that a market-based rule for wine fermentation will obtain emission reductions more expediently than a conventional command and control approach and would provide winery operators flexibility to develop cost effective fermentation emissions control technology. The concept is consistent with US EPA guidance for control measures incorporating a market-based approach, and could be the basis for additional market-based control measures to be developed by the District.

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