

**CHARACTERIZATION OF EMISSION SOURCES
NEAR CLASS I AREAS IN THE WRAP REGION**

Final Work Plan

Prepared for

Western Governors' Association
1515 Cleveland Place, Suite 200
Denver, CO 80202
Phone: (303) 623-9378

Prepared by

ENVIRON International Corporation
101 Rowland Way, Suite 220
Novato, CA 94945

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1.0 INTRODUCTION

The Areas Within and Near Class I Areas Forum (hereinafter referred to simply as the Forum) of the Western Regional Air Partnership (WRAP) is responsible for implementing the recommendations of the Grand Canyon Visibility Transport Commission (GCVC) to expand data collection, improve modeling, and implement cooperative, enforceable management plans in and near Class I areas. The Forum is currently completing a detailed assessment of emissions within eight national parks on the Colorado Plateau, and the National Park Service is evaluating emissions in an additional twenty parks. The work to be performed by ENVIRON as described in this Work Plan is for characterizing emissions near Western Class I visibility areas. The Western States in the WRAP region to be included in this analysis are Alaska*, Arizona, California, Colorado, Idaho, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming.

The overall goal of the proposed project is to develop a set of maps and tables that portray and characterize the emissions near Class I areas. To achieve this goal, the following tasks will be performed:

- Task 1: Develop a Work Plan
- Task 2: Map Point Sources
- Task 3: Interview State Officials and Federal Land Managers
- Task 4: Map Area and Mobile Sources
- Task 5: Classify Class I Areas
- Task 6: Select a Subset of Class I Areas for In-Depth Analysis
- Task 7: Perform an In-Depth Characterization of Emission Sources for the Subset of Class I Areas Selected in Task 6
- Task 8: Prepare and Submit Web Pages
- Task 9: Prepare and Submit Reports and Relevant Data

Section 2 of this Work Plan provides a detailed description of the technical approach for each of these tasks. The work will be performed in accordance with the project schedule provided in Section 3, which also includes a list of project deliverables.

* Alaska was not in the original set of WRAP states, and the WRAP emissions databases do not currently include Alaska. Alaska Class I areas will therefore be analyzed only partially in this project.

2.0 TECHNICAL APPROACH

CLASS I AREAS AND BUFFER ZONES

In order to characterize the emissions near Class I Areas, a buffer zone will be defined within which emission estimates will be developed. There are essentially two alternative approaches that can be considered in defining the buffer zones. One approach is to define the area to be surveyed as a buffer of a certain distance surrounding the boundaries of the Class I areas, such as 30 miles as suggested in the project RFP. The second approach is to define the areas to be surveyed as all counties within a certain distance of the Class I areas. Both approaches are technically feasible using graphical information systems (GIS) software, as the GIS coordinates of the Class I areas are readily available. However, because the primary emissions data sources have emissions at the county level, the second alternative would not provide any additional information with respect to the level of emissions actually within the buffer zone and will often contain sources far from the area. The first approach will require considerably more resources to allocate county emissions to only those portions of the counties within the desired distance of park boundaries. Nevertheless, given the need to adequately characterize the emission sources near the Class I Areas, ENVIRON suggests that the buffer zones be defined as a fixed distance of 50 km (~ 31 miles) around the boundaries of the Class I areas.

Within the WRAP region there are 116 Class I areas, many of which are within 50-km of each other. Figure 2-1a displays the Class I Areas in the conterminous US with a 50-km buffer around each while Figure 2-1b displays the two Class I Area within Alaska to be included in the analysis. In addition, since the decision to define the buffer zones as a fixed distance from the Class I area boundaries requires additional resources to allocate county-level emissions to the buffer zones, it is desirable to minimize the total number of regions for the analysis. To reduce the total number of regions, Class I areas will be grouped together with the buffer zone defined such as to encompass all areas within the group. The criteria for grouping Class I areas will be primarily based on proximity. Table 2-1 presents the grouping scheme based on visual inspection of the regions displayed in Figure 2-1. This grouping results in a total of 82 regions.

WRAP Class I Areas



Figure 2-1a. Class I Areas in the Western Continental US with 50-km buffer zones.

WRAP Class I Areas

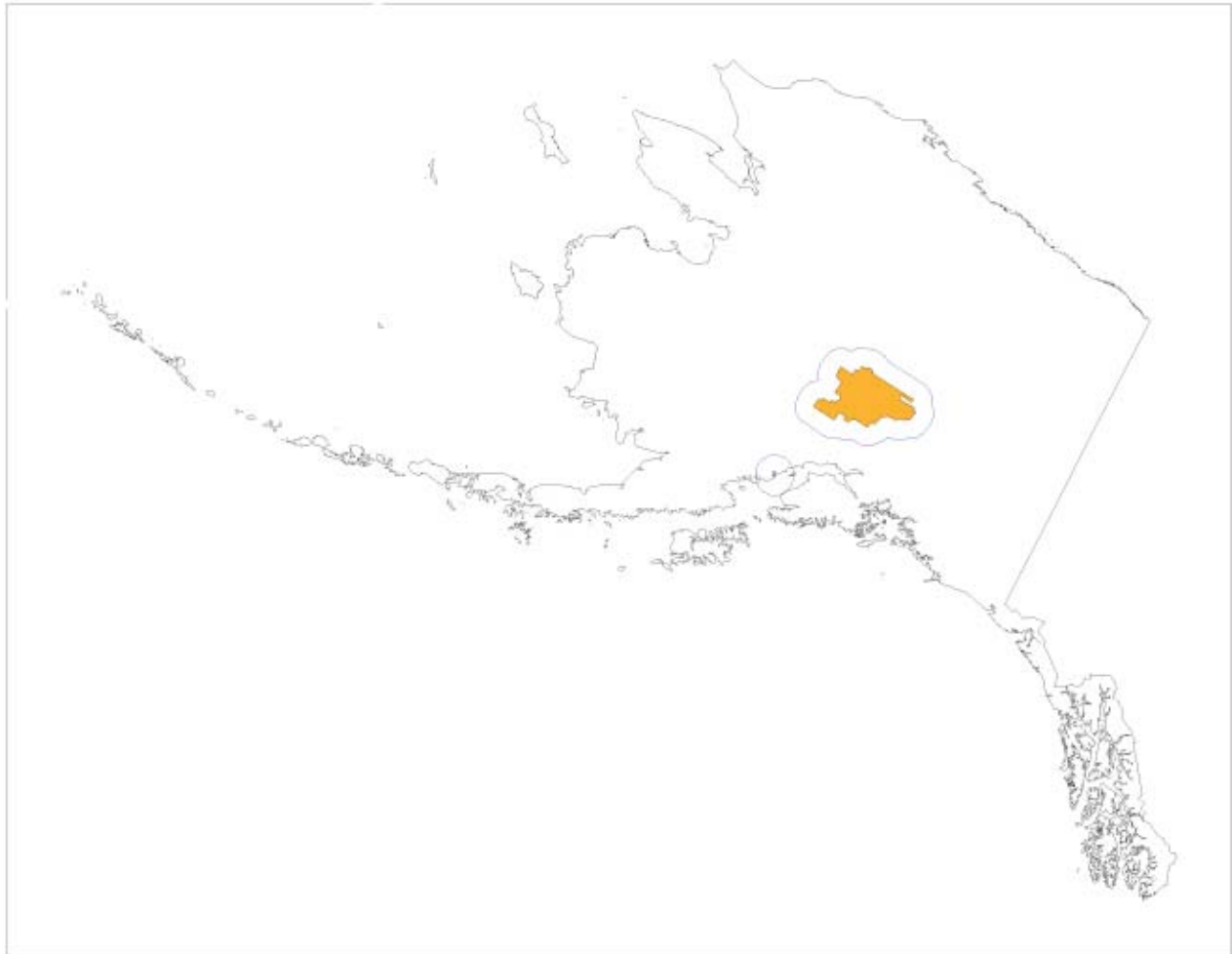


Figure 2-1b. Denali and Tuxedni Class I Areas in Alaska with 50-km buffer zones.

Table 2-1. Class I Area groupings.

Group	Class I Areas
1	Olympic NP, WA
2	Pasayten Wilderness, WA North Cascades NP, WA Glacier Peak Wilderness, WA
3	Alpine Lake Wilderness, WA
4	Mount Rainier NP, WA Goat Rocks Wilderness, WA
5	Mount Adams Wilderness, WA
6	Mount Hood Wilderness, OR
7	Mount Jefferson Wilderness, OR Mount Washington Wilderness, OR Three Sisters Wilderness, OR
8	Diamond Peak Wilderness, OR
9	Crater Lake NP, OR
10	Mountain Lakes Wilderness, OR
11	Kalmiopsis Wilderness, OR
12	Gearhart Mountain Wilderness, OR
13	Strawberry Mountain Wilderness, OR
14	Eagle Cap Wilderness, OR
15	Hells Canyon Wilderness, OR/ID
16	Cabinet Mountains Wilderness, MT
17	Selway-Bitterroot Wilderness, ID/MT
18	Sawtooth Wilderness, ID
19	Craters of the Moon NM, ID
20	Anaconda-Pintler Wilderness, MT
21	Red Rock Lakes, MT
22	Glacier NP, MT
23	Gates of the Mountains Wilderness, MT
24	Mission Mountains Wilderness, MT Scapegoat Wilderness, MT Bob Marshall Wilderness, MT
25	Theodore Roosevelt NP, ND
26	Medicine Lake, MT
27	UL Bend, MT
28	Lostwood, ND
29	Wind Cave NP, SD
30	Badlands NP, SD
31	Jarbridge Wilderness, NV
32	Bridger Wilderness, WY Fitzpatrick Wilderness, WY
33	North Absaroka Wilderness, WY Teton Wilderness, WY Washakie Wilderness, WY Grand Teton NP, WY Yellowstone NP, WY/ID/MT
34	Mount Zirkel Wilderness, CO Rawah Wilderness, CO
35	Flat Tops Wilderness, CO

Group	Class I Areas
36	Eagles Nest Wilderness, CO
37	Rocky Mountain NP, CO
38	Maroon Bells-Snowmass Wilderness, CO West Elk Wilderness, CO
39	Black Canyon of the Gunnison NM, CO
40	La Garita Wilderness, CO Weminuche Wilderness, CO
41	Mesa Verde NP, CO
42	Great Sand Dunes NM, CO
43	Bryce Canyon NP, UT Zion NP, UT
44	Capitol Reef NP, UT
45	Canyonlands NP, UT Arches NP, UT
46	Grand Canyon NP, AZ
47	Sycamore Canyon Wilderness, AZ
48	Superstition Wilderness, AZ Sierra Ancha, AZ
49	Mount Baldy Wilderness, AZ
50	Mazatzal Wilderness, AZ Pine Mountain Wilderness, AZ
51	Chiricahua NM, AZ Chiricahua Wilderness, AZ
52	Galiuro Wilderness, AZ
53	Saguaro NM (East), AZ
54	Saguaro NM (West), AZ
55	Petrified Forest NP, AZ
56	Gila Wilderness, NM
57	White Mountain Wilderness, NM
58	Salt Creek, NM
59	Bosque del Apache, NM
60	Carlsbad Caverns NP, NM
61	Wheeler Peak Wilderness, NM
62	San Pedro Parks Wilderness, NM Bandelier NM, NM
63	Pecos Wilderness, NM
64	Redwood NP, CA
65	Marble Mountain Wilderness, CA
66	South Warner Wilderness, CA
67	Lava Beds NM, CA
68	Caribou Wilderness, CA Thousand Lakes Wilderness, CA Lassen Volcanic NP, CA
69	Point Reyes NS, CA
70	Yolla Bolly Middle Eel Wilderness, CA
71	Pinnacles NM, CA Ventana Wilderness, CA
72	San Rafael Wilderness, CA
73	Joshua Tree NM, CA

Group	Class I Areas
74	San Geronio Wilderness, CA San Jacinto Wilderness, CA
75	Cucamonga Wilderness, CA San Gabriel Wilderness, CA
76	Dome Land Wilderness, CA
77	Desolation Wilderness, CA Mokelumne Wilderness, CA
78	Emigrant Wilderness, CA Hoover Wilderness, CA Yosemite NP, CA
79	John Muir Wilderness, CA Kaiser Wilderness, CA Kings Canyon NP, CA Sequoia NP, CA Minarets Wilderness, CA
80	Agua Tibia, CA
81	Denali NP, AK
82	Tuxedni Wilderness, AK

EMISSIONS DATA SOURCES

For all states except Alaska, WRAP 1996 emissions data will be used as the basis for characterizing the emissions around each Class I area. For Alaska, we will use EPA's 1996 National Emissions Trends data (NET96), as Alaska has no other emission inventory available¹. More localized and/or more recent emission inventories may be available for the in-depth analysis of a subset of the Class I areas.

The pollutants included in the emissions characterization will be those pollutants estimated in the WRAP emission inventories that are important contributors to visibility impairment:

- Particulate matter (PM₁₀ and PM_{2.5}),
- Sulfur oxides (SO_x),
- Nitrogen oxides (NO_x),
- Volatile organic compounds (VOC), and
- Ammonia (NH₃).

For the analysis of all areas, the 1996 county-level annual emissions will be used for all non-point sources. WRAP seasonal emissions estimates will be reviewed for the in-depth analysis of a subset of the areas. Note that the NET96 data to be used for Alaska emissions does not include EC/OC estimates.

Point source emissions will be obtained from the WRAP 1996 point source emissions files prepared by Pechan; NET96 will be used for Alaska. ENVIRON will use the revised 1996 point source emissions file received from Pechan in mid-December, 2001 (revisions were made for some Nevada point sources, and for some Pima County, AZ point sources).

¹ Per discussion with Alice Edwards, Alaska Department of Environmental Conservation

On-road mobile source emissions will be obtained from the WRAP 1996 on-road emissions estimates prepared by ENVIRON, and from the NET96 for Alaska. Note that there is an inconsistency between these two data sources – the WRAP 1996 emissions are based on EPA’s MOBILE6 model, while the NET96 emissions are based on the earlier MOBILE5 model.

Off-road mobile source emissions will be obtained from the updated (with NONROAD2002 model) WRAP 1996 off-road emissions estimates prepared by ENVIRON, and from the NET96 for Alaska. Here too there is an inconsistency between these two data sources – the WRAP 1996 emissions are based on EPA’s latest NONROAD model, while the NET96 emissions are based on the much older NEVES study.

Area source emissions will be obtained from the WRAP 1996 area source files prepared by PES, and from the NET96 for Alaska. The WRAP 1996 area source emissions are largely based on the NET96, with some state updates. Emissions from wildfires and prescribed wildland fires will be determined for the buffer zones based on the WRAP 1996 fire databases developed by Air Sciences. It is important to note that there are no estimates of windblown dust emissions in the WRAP area source emissions files; ENVIRON is currently developing windblown dust emissions for the WRAP region, but this work will not be completed in time for use in this project.

GIS DATA SOURCES

A variety of geospatial data will be required both for generating maps and displays as well as for spatial allocation of county-level emission estimates to the appropriate buffer zones. Numerous databases of geospatial and population data are available from various sources, primarily from the USGS and EPA. The following GIS data will be used as part of the emission characterizations conducted during the project:

- Land Use/Land Cover (LULC) – specifies land types (urban, agricultural, forest, etc) and areal coverage for spatial allocation of area sources
 - EPA Spatial Surrogate database (Housing statistics, urban/rural classification, agricultural lands, forest lands) (ftp://ftp.epa.gov/EmisInventory/emiss_shp)
 - North America Land Cover Characteristics (NALCC) – High resolution (1-km) LULC coverage for the North American Continent – Includes a modified Anderson Level 2 classification scheme (http://edcdaac.usgs.gov/glcc/tabgoode_globe.html)
- Transportation Networks – Specifies roadway types, railways, airport and ports used for spatial allocation of on-road mobile and off-road mobile emission sources. The EPA Spatial Surrogate database will be used for these categories. (ftp://ftp.epa.gov/EmisInventory/emiss_shp).
- Housing Statistics – provides statistics on number and location of housing units for spatial allocation of area sources. The EPA Spatial Surrogate database will be used for these categories. (ftp://ftp.epa.gov/EmisInventory/emiss_shp)

- Population – used for spatial allocation of area sources. 1-km Gridded Global population data set for 1995 from Center for International Earth Science Information Network, Columbia University. (<http://sedac.ciesin.columbia.edu/plue/gpw/>)

In addition to the geospatial and population data required for spatial allocation of emissions estimates, the locations of the Class I Areas within the WRAP States will be needed for defining the buffer zones. These data are available from the National Park Service web site at <http://www2.nature.nps.gov/ard/parkhp.html>. These data are maintained by the specific government agency responsible for each Class I Area. This includes the US Dept. of the Interior National Park Service, the US Dept. of the Interior Fish and Wildlife Service and the US Dept. of Agriculture Forest Service. An initial examination of the datasets obtained from the above links revealed that several Class I Areas in the west were not present in the data. The required Class I Area boundary information for these regions were obtained from <http://www.nationalatlas.gov/wildrnm.html/>

Two of the four Class I areas in Alaska are to be included in the analysis (Denali National Park and Tuxedni Wilderness Area). While the EPA Spatial Surrogate data includes only the conterminous US, both the global population and the NALCC databases include the state of Alaska. Thus an alternative dataset will be required for the transportation networks. ENVIRON will obtain the latest Census/TIGER Line data files which provide the necessary data regarding roadway types and railroads for each individual county. These data are not being used for the rest of the Class I Areas due to the labor intensive processing required to extract the necessary data on a county-by-county basis.

The geospatial data for use in development of spatial surrogates are generally based on data from a variety of years. The EPA's spatial surrogate data for housing characteristics is based on the 1990 US Census, as are the urban/rural classifications and roadway GIS coverages. Population data is based on the 1995 global population datasets listed above. Land use/Land cover data is based on 1992-1993 AVHRR satellite imagery. The remaining transportation network data (airport, port, railroads) was derived from the National Transportation Atlas Database, 1999, Bureau of Transportation Statistics.

WORK TASKS

Task 1: Develop a Work Plan

This document is the final work plan. The draft work plan was prepared and sent to Forum members in early December, 2001. This final work plan has been revised per discussion at a Forum meeting held at ENVIRON's Novato, CA office on December 10, 2001, and per additional email and conference call discussions on several topics after the meeting.

Task 2: Map Point Sources

As part of this task, ENVIRON will use the Arc/INFO GIS software to plot all stationary sources in the vicinity of each Class I area. The latest available WRAP 1996 stationary source

inventory will be used for all states except Alaska. Point source emission inventory data for Alaska will be based on the NET96 available from the EPA.

Each plot developed under this task will include the boundaries of the Class I area(s) within the region and will indicate the buffer zone around each area. Point source emissions will be displayed as “bubble plots” indicating the relative emission rate of each source and labeled uniquely with a numeric identification code. Due to the relatively large number of stationary point sources, each “bubble” will represent the total point source emissions within a 36-km grid cell and each label will correspond to multiple sources. Corresponding tables will be generated such that the source names, type, location and emission rate of each pollutant shown on the map can be looked up based on the source identification code displayed on the map.

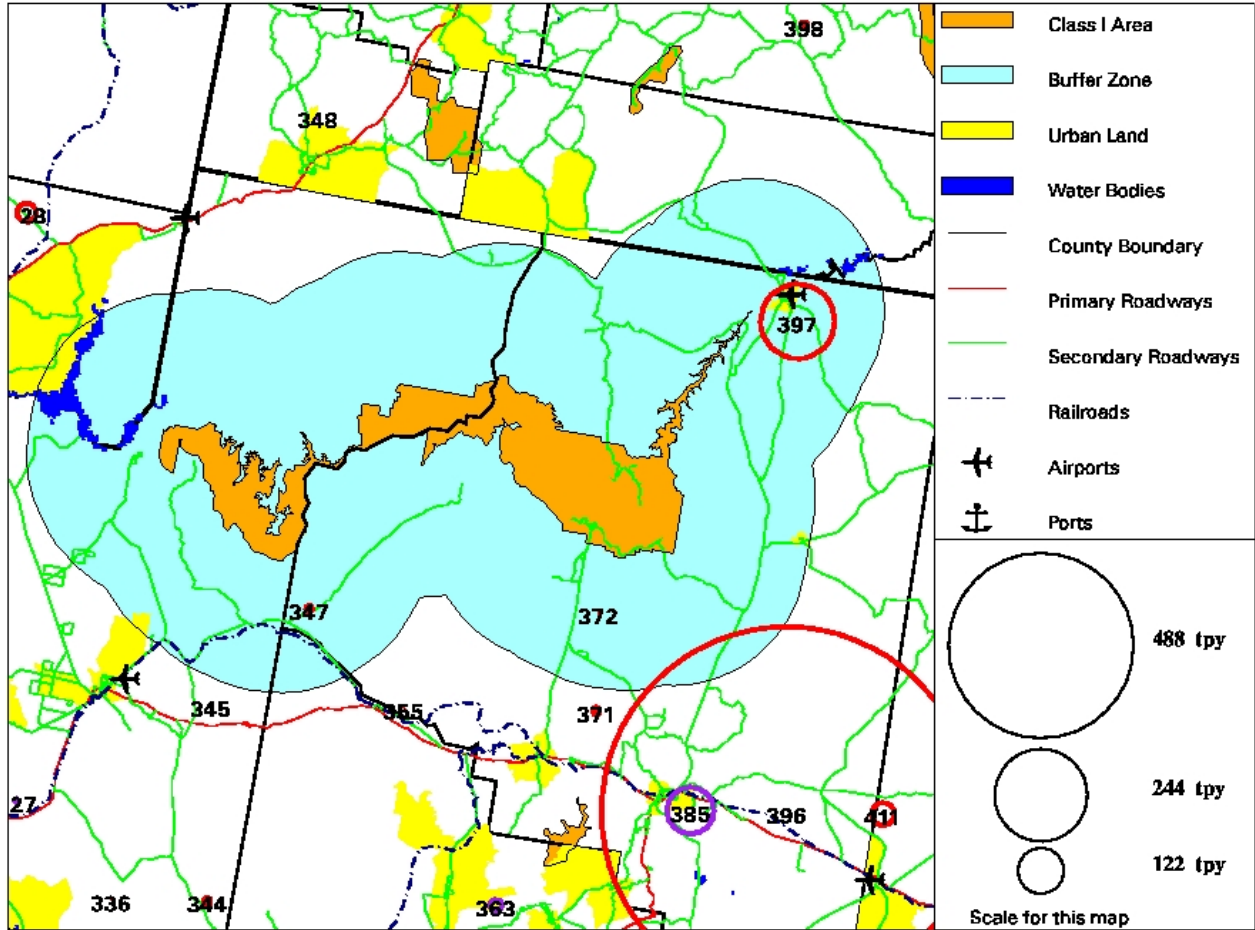
Political and geographic features will be displayed to the extent that sufficient detail is present to facilitate identification of each source and geographical orientation of the region being displayed. Features which will be displayed include the boundaries of all Class I areas in the region, the buffer zone around the Class I area(s) of interest, county boundaries, urban areas, transportation networks (roadways and railroads), water bodies, airports and ports. The emissions spatial surrogate data developed by the EPA will be used as the basis for the transportation networks, urban areas and water bodies.

Figure 2-2 presents a sample of the type of maps to be produced under this task. The corresponding point source emissions data are presented in Table 2-2.

At the completion of Task 2, ENVIRON will submit a Task 2 Technical Memorandum describing the development of point source maps, data sources and sample maps. The full set of electronic map files will be provided to WGA at this time.

WRAP 1996 Point Source Emissions - VOC (tpy)

Facility emissions aggregated to 36-km cells: purple = multiple facilities; red = single facility



Grand Canyon NP

Figure 2-2. Sample point source map for the Grand Canyon National Park.

Table 2-2. Point source VOC emissions (tons per year) for the points in the vicinity of the Grand Canyon National Park.

GRID_ID	PLANT_ID	FIPS	PLANT_NAME	Longitude	Latitude	VOC
327	229		4015 Ford Motor Company Arizona Proving Ground	-114.13	34.88	7.30
328	P002		32003 REID GARDNER	-114.63	36.66	49.78
336	1041		4015 El Paso Natural Gas Company Dutch Flat C	-113.99	34.56	1.10
337	138		32003 SIMPLOT SILICA	-114.45	36.50	0.00
344	405		4025 CYPRUS BAGDAD COPPER CORP Cyprus Baghdad	-113.24	34.59	19.08
345	131		4015 Transwestern Pipeline Company Kingman	-113.36	35.20	0.86
345	522		4015 El Paso Natural Gas Company Hackberry Co	-113.70	35.17	0.34
347	698		4025 Chemical Lime Co. Nelson Lime Plant	-113.31	35.52	16.88
348	11		49053 St. George City Power Plant	-113.66	37.13	1.97
348	11		49053 Plant #12 (Geneva Slag Operations)	-113.66	37.13	1.97
355	1199		4025 El Paso Natural Gas Company Seligman Com	-112.76	35.29	0.10
363	18		4025 Sturm Ruger & Co. Inc. Prescott Operation	-112.43	34.65	4.04
363	421		4025 Phoenix Cement Portland Cement Plant	-112.08	34.78	0.00
371	873		4005 El Paso Natural Gas Company Williams Com	-112.07	35.31	19.59
372	133		4005 Transwestern Pipeline Company Flagstaff	-112.04	35.63	2.98
385	626		4005 El Paso Natural Gas Company Flagstaff Co	-111.56	35.23	28.93
385	1678		4005 Wisconsin Tissue Mills Inc. Flagstaff Pl	-111.63	35.19	94.90
396	565		4005 EL PASO NATURAL GAS CO. ENVIRONMENTAL AF	-111.09	35.31	975.62
397	4		4005 NAVAJO	-111.39	36.91	196.43
398	3		49017 ESCALANTE MICRO ENR.	-111.60	37.83	18.61
411	137		4005 TRANSWESTERN PIPELINE COMPANY	-110.85	35.30	59.06

Task 3: Interview State Officials and Federal Land Managers

The characterization of emissions near Class I areas will begin with a survey of state officials and federal land managers with knowledge of each of the Class I areas in the WRAP region to obtain basic information on the presence and role of local emission sources on visibility in all Class I areas. The WGA will provide the initial list of contacts. Based on conversations with WGA, we expect this initial list to lead to a more complete list (resulting from referrals of initial list members) of about 50 contact names with telephone numbers, affiliation, and email address (many individuals are expected to be familiar with more than one area).

The initial contact with each interviewee will be an email that provides the following:

- A brief description of the project and the purpose of the interview,
- The maps and point source emissions tables prepared under Task 2 for the area(s) for which the interviewee is expected to have information, and
- A list of interview questions.

The interviewees will be requested to answer the questions and provide any other relevant information, within two weeks of receipt of the email. Interviewees will be told that the information requested can be provided either by email to ENVIRON (preferred), or by telephone interview. A follow-up call will be made to each contact to assure that they received the email, to check that they are the appropriate contact for the areas listed, and to ask for other contact names if others are more appropriate. We expect that follow-up calls

will be needed to clarify information provided in email and to remind nonrespondents if we have not heard from them by the requested date.

The questions to be asked of for each interviewee/area are as follows:

1. Please verify the location and operational status of major stationary sources listed in the attached maps and tables. Are any of the identified point sources no longer in operation? Have any of the identified point sources made any major changes that would increase or decrease emissions from 1996 levels?
2. Are there major point sources in the vicinity of the Class I area that are currently in operation but not listed in the maps and tables? Are there plans for any new major point sources in the future?
3. What are the primary emissions-generating activities within the buffer zone of the Class I area?
4. What local sources, if any, do you believe contribute to visibility impairment in the Class I area?
5. Are there any recent or expected activity changes in or near the area that could affect visibility in the area?
6. For areas that are not National Parks, can you provide any data trends on visitation to the area both in the past and expected in the future? At this point in time we are not requesting that you send us such data, only that you tell us what data you have (e.g., is it area-specific, and what years does it cover).
7. Are there any air quality studies (monitoring or modeling) that have been planned or recently completed?

Information obtained from the email and telephone surveys will be housed in an Access database. This database will contain related tables that will link the various categories of information and allow for querying of information on different criteria. Figure 2-3 shows the preliminary database structure in which the data will be stored. The Class I Area information and contact information supplied by WGA will be known and stored in the database before the interviews commence. During the course of the interviews, additional contacts will be added as they are made.

As a contact may have information on more than one Class I Area, notes will be stored separately for each contact and Class I Area combination. These notes will be kept in a memo field, EmissionsInformation in tblEmissionsInformation in Figure 2-3, which can contain several pages worth of text. In addition to any emissions information the contact provides, the notes will contain any useful reference information including the dates and times of all phone conversations and email in the process of obtaining the information. Upon completion, information can be queried on different parameters including all information received from one contact and all information received from all contacts for a specific Class I area. The

complete data base will be provided to WGA at the completion of the project. (Interim versions of the data base can also be provided if requested.)

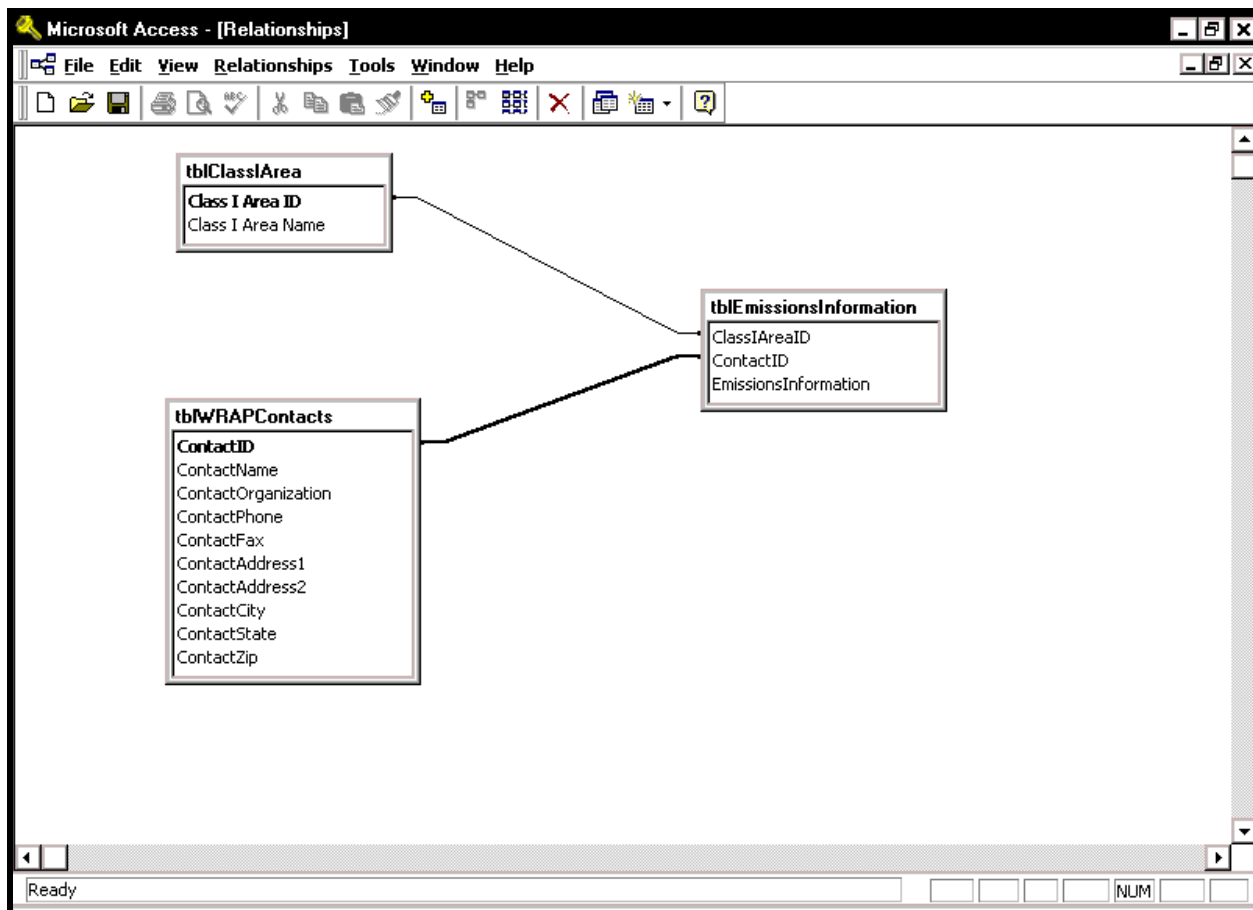


Figure 2-3. Proposed Access database structure for storage of survey contacts and responses.

At the completion of Task 3, ENVIRON will submit a Task 3 Technical Memorandum and informal database summarizing the results of interviews with land managers and state officials. The technical memorandum will include and major changes (e.g., a point source shutdown) or activities at Class I areas noted by survey respondents.

Task 4: Area and Mobile Sources

In this task ENVIRON will use GIS software and appropriate surrogate data to spatially allocate area and mobile source emissions within the 1996 county-level WRAP inventories to the buffer zone of each Class I area. Due to the relatively large number of surrogates used to allocate area and mobile source emissions, as well as the large number of Class I Areas considered, development of displays for each surrogate used would exceed the available resources for this task. Therefore, maps will be developed which display the underlying land use/land cover (LULC) data and population density within the region used for the spatial allocation of county-level emissions to the buffer zones. The maps will be drawn to the same

scale and contain the same political and geographic features as in Task 2. Tables summarizing the area and mobile source emissions by county within the buffer zones will be developed. Emissions presented in the tables will be aggregated to general source categories.

Spatial allocation of regional or county-level emission estimates is accomplished through the use of gridding surrogates or spatial allocation factors (SAFs), for each emission source category or groups of source categories. Spatial surrogates are typically based on the proportion of a known region-wide characteristic variable that exists within the modeling domain grid cells. Traditionally, the development of spatial gridding surrogates has been performed by a variety of methods depending on the emission source category being considered, the required spatial resolution, the geographic extent of the domain, and the particular characteristics of the geospatial data available. Spatial surrogates must define the percentage of regional or county level emissions from a particular source category that is to be allocated to some spatial region, typically a modeling grid cell. For most area sources these percentages are based on areas of a particular land use/land cover or vegetation type, while for mobile source categories the percentages are usually based on total length of a certain road type, or transportation network. Often the population is also used as a spatial surrogate for certain emission source categories.

The spatial surrogate definitions and emission source category/surrogate relationships used for the project will be based on those developed by the EPA. Table A-1 in Appendix A lists the area source emission source category codes (SCCs) as obtained from the WRAP 1996 area source database. Also included in Table A-1 are the spatial surrogate assignments as defined by the EPA. On-road and off-roads SCCs and surrogate assignments are listed in Table A-2 through Table A-4. The spatial surrogates that will be used for the project include:

- Agricultural land
- Forest land
- Urban land
- Water
- Total population
- Urban population
- Rural population
- Inverse population
- Housing
- Railways
- Urban primary roadways
- Urban secondary roadways
- Rural primary roadways
- Rural secondary roadways

Emissions for airports (aircraft and ground support equipment) and commercial marine emissions are available in the WRAP off-road emissions data sets on a county level. These emissions will not be spatially allocated in this task because of the large uncertainty that would be introduced in spatially allocated emissions using the approach discussed above. In the WRAP off-road county-level data sets, only total emissions are reported for each of these categories. While the WRAP aircraft emissions were estimated using landing and take off

(LTO) activity levels, the number of airports per county and the LTOs per airport are not in the county-level data base. Using any of the spatial surrogates to allocate airport emissions in counties where there are two or more airports of greatly varying size may incorrectly place excessive airport emissions within the buffer zone. The airport emissions can be correctly allocated by going back to the original airport emissions calculations and allocating using individual airport locations and LTO or emissions, however project resources are insufficient for this allocation.

Similarly, commercial marine emissions were estimated using activity at individual ports, but this detailed information per port is not part of the WRAP county-level commercial marine estimates. Ports with strikingly dissimilar activity rates can be found in proximity to one another. A California example is Port Hueneme located near Oxnard, very close to the ports of Los Angeles/Long Beach that twice as much traffic; in addition, ship channels that handle north bound traffic from Los Angeles/Long Beach pass by the Port of Hueneme. An Oregon example of ports with very dissimilar activity that are close to each other are the ports of Portland (34.3 million tons in 2000), Vancouver (WA) across the river (7.7 million tons), Kalama about 25km downriver (5.8 million tons), Longview 14km down from Kalama (4.1 million tons); and traffic proceeds up and down river through several counties with other ports to reach Portland. A Washington example is that Olympia is a small port close to Tacoma, a large port; the Puget Sound also has shipping lanes that each handle traffic to various ports. The number of ports within an area of interest is therefore not a reasonable method to allocate county commercial marine emissions. As with airport emissions, the allocation can be done by going back to the raw calculations of activity and emissions at each port, but project resources are not available for this additional work.

Emissions from wildfires and prescribed wildland fires will be determined for the buffer zones based on the WRAP 1996 fire databases developed by Air Sciences. These databases contain fire emissions for each fire and for each day during 1996 in terms of point locations (and are therefore treated as point sources) and, in some cases as total acres burned. Because the overall extent and shape of the burn areas are not known, and because many emission records do not include the total acres burned it is not possible to determine the areal extent of the fires within the buffer zones around each Class I Area. As an alternative, the fire emissions will be treated as point sources using the coordinates given in the database. Overlaying these data with the buffer zones will allow an estimate of the fire emissions within the buffer zones and the potential to impact the Class I Areas. The Air Sciences databases do not include prescribed wildland fires for the state of California. For California, the databases maintained by the California Air Resources Board (ARB) will be used for estimating fire emissions within California. The ARB databases provide only total annual emissions by type of fire and by county for 1996. Therefore, estimates of prescribed wildland fire emissions for CA will be determined using procedures similar to other area sources, which are defined by county-level annual emission estimates. Estimates of the fire emissions within the buffer zones will be determined by using forestland as a spatial surrogate to determine the percentage of forestland in each county within each buffer zone, and allocated this percentage of the total county-level fire emissions to the appropriate Class I Areas. Finally, as the ARB database does not include PM_{2.5} or NH₃ emissions, these pollutants will be estimated using appropriate scaling factors based on piled fires.

Figure 2-4 presents a sample of the types of plots which will be prepared as part of this task. Displayed in the figure are the LULC data, transportation networks, political boundaries, Class I Areas and the buffer zone for the Grand Canyon National Park. Table 2-3 presents a sample of the types of tables that will be generated for each Class I Area or group of Class I Areas. Note that the emissions presented in the tables are annual estimates and include only those emissions that are within the buffer zones. Also note that these emissions estimates include the contribution from inside the Class I Area, but not the more refined “in-park” inventories developed for many of the National Park Class I Areas. For each Class I area, the emissions tables will include emissions by county for each county within the buffer zone, and then total emissions within the buffer zone.

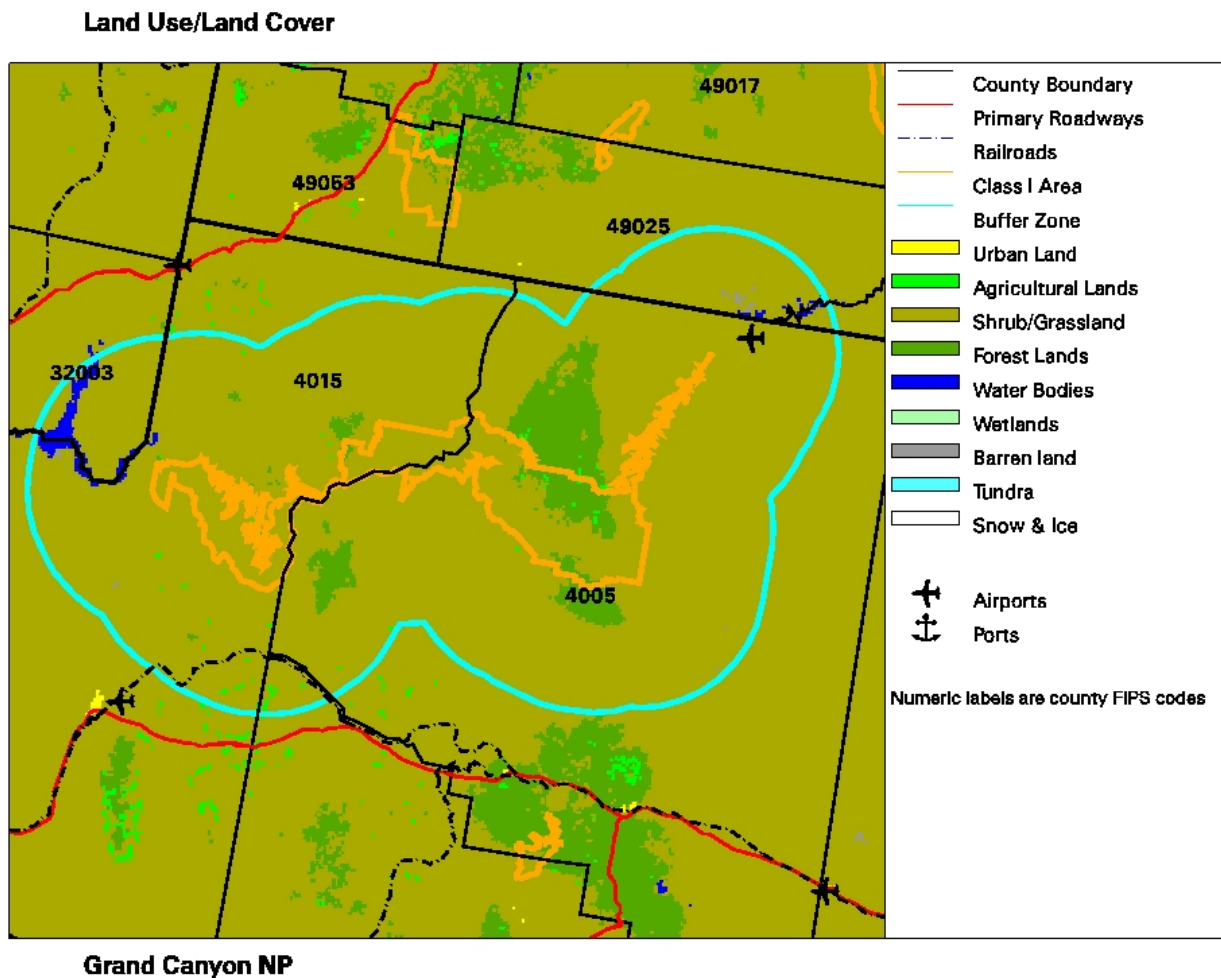


Figure 2-4. Sample Land Use/Land Cover display for the Grand Canyon NP.

Table 2-3. Source sub-categories to be reported for area and mobile sources emissions. Emissions will be reported as tons per year. Totals will be provided for each source category in addition to the individual subcategory emissions.

Source Category	PM10	PM2.5	SOx	NOx	VOC	NH3
Point Sources						
Area Sources (excluding windblown dust)						
Residential Wood Combustion						
Other Fuel Combustion						
Industrial Processes						
Solvent Utilization						
Petroleum Storage and Transport						
Waste Disposal and Recycling						
Agricultural Activities (except burning)						
Agricultural Burning						
Prescribed Fires						
Wildland Fires						
On-Road Mobile Sources						
Light-Duty Vehicle Emissions (Exhaust, Tire Wear, & Brake Wear)						
Heavy-Duty Vehicle Emissions (Exhaust, Tire Wear, & Brake Wear)						
Fugitive Dust – Paved Roads						
Fugitive Dust – Unpaved Roads						
Off-Road Mobile Sources (excluding airport and commercial marine)						
Airport Ground Support Equipment						
Lawn & Garden Equipment						
Recreational Equipment						
Commercial and Industrial Equipment						
Construction and Mining Equipment						
Agricultural Equipment						
Recreational Marine Vessels						
Locomotives and Railroad Equipment						
TOTAL EMISSIONS						

At the completion of Task 4, ENVIRON will submit a Task 4 Technical Memorandum detailing data sources and development of area and mobile source maps. The full set of electronic maps and tables will also be provided to WGA at this time.

Task 5: Classify Class I Areas

In this task ENVIRON will classify each Class I area primarily on the basis of emissions within the buffer zone. Tables and/or maps will be prepared that show the areas with the highest emissions for each pollutant, and areas with the highest proportion of emissions for each of the major source categories.

One way to portray the emissions information is to prepare a large table where the rows are the Class I areas, and the columns are the pollutants for each major source category. The cells in the table could be filled in with the actual emissions in tons per year, or the proportion of total emissions for each pollutant. These cells in the table could then be color coded by quintile; i.e., the highest 20 percent would be in one color, the next highest 20 percent in

another color, etc. Such tables would allow an overall visualization of where the largest emissions sources are, and where, e.g., point sources account for the largest fraction of total emissions.

Ratios of emissions to monitored visibility will also be evaluated, using visibility data from the IMPROVE monitoring network. Such ratios can be used to identify areas most at risk to nearby emissions, i.e., relatively clean Class I areas with significant emissions sources in their buffer zones. For this analysis, ENVIRON will use a data set of five-year averages (1997-2001) of the worst 20% of days at IMPROVE sites that is currently being prepared as part of the VIEWS² analysis, following EPA regional haze guidance. These five-year averages will be available for about 40 IMPROVE sites.

Task 6: Select a Subset of Class I Areas for In-Depth Analysis

A subset of the Western Class I areas will be selected for more detailed analysis under Task 7. The criteria to be used for selecting the subset of Class I areas for more detailed analysis will include the following:

- Magnitude of local emissions sources. Priority should be given to areas with relatively high local emissions, with the exception noted below.
- Proximity of major urban areas. Areas near large cities (e.g., San Geronio) should be avoided since such areas are often subject to existing emission control plans and would require substantial resources for in-depth analysis.
- Availability of IMPROVE data. Such data could help identify sources and trends.
- Availability of WRAP and NPS in-park micro inventories. Such inventories would add considerable value to the in-depth analysis of nearby activities.
- Local population change. Substantial increases would indicate a growing risk from nearby sources and a warning sign for air quality managers.
- Proximity of gateway communities. Analysis of areas with gateway communities would assist the Forum in its other activities.
- Interview results from Task 3. The interviews may reveal issues or trends not evident in project databases, or may verify such issues or trends.
- Ratio of emissions to monitored visibility. High ratios indicate a higher susceptibility to local impacts.
- Diversity of local emissions. Areas with relatively high local emissions of more than one pollutant and/or areas with an even distribution of local source categories may produce more interesting results.
- Prevalence of wind-blown fugitive dust. This inventory is currently under development, so areas dominated by wind-blown dust may not benefit much from closer inspection.
- Decisions also need to be made whether Class I areas with local fire emissions should be included.

ENVIRON will submit a Task 6 Technical Memorandum recommending the selection of the subset of Class I area for in-depth analysis. A conference call will be held with the Forum to

² Visibility Improvement Information Exchange Web System, at <http://vista.cira.colostate.edu/views/>

review, and modify if necessary, ENVIRON's suggestions before proceeding with the remainder of the work.

Task 7: Perform an In-Depth Characterization of Emission Sources for the Subset of Class I Areas Selected in Task 6

For the Class I areas selected under Task 6 above, a more in-depth analysis of the nearby emissions sources and local air quality data will be undertaken to characterize the impacts of local sources on visibility degradation. More in-depth interviews will be conducted with local officials to provide better characterization of the impacts of local emissions and changes in local emissions over the years. Any available appropriate in-park emission inventories will be reviewed. The IMPROVE data for the Class I area will be analyzed in more detail over more years and correlations between the trends in the IMPROVE PM concentrations and changes in local sources identified will be assessed. We will request from local officials any recent local GIS data (LULC, transportation networks, etc) and population data which may aide us in the characterization and the in-depth analysis. We will also discuss with local officials any significant seasonal variation in activity. To the extent feasible, we will strive for consistency across the subset of Class I areas to facilitate comparison; however, by the nature of this task we expect to have a variety of different types of information available for each Class I area.

At the completion of Task 7, ENVIRON will submit a Task 7 Technical Memorandum documenting the additional data evaluated and methodologies for the in-depth analysis of Class I subset.

Task 8: Prepare and Submit Web Pages

The website will consist of a main page displaying a very brief summary of report objectives and a map of all the Western Class I areas and their buffer zones. When the user moves the mouse over the notation for a Class I area or the name, the pointer shape will change to a hand pointing with a finger, and the name of the Class I area will appears next to the pointer. The main page will also have a list of the Western Class I areas by state to allow users to visually scan a list and select an area (or group of areas).

When the user clicks on a Class I notation or the name of a Class I area, the summary page for that site will be displayed. The top of the summary page will have a list of tables and maps. Each item listed will be a link to its corresponding section further down the page. Each Class I area will have a web page that includes all maps and tables for that area, as well as a link to download all of the area-specific maps and tables in a single Zip file. Appendix B shows an example of the main page, followed by an example of the layout for one of the Class I area web pages.

When the main buffer zone map is finalized, the main page will be developed with the buffer zone map as a graphic image. Image maps will then be created to link to each Class I area specific page. A webpage template will then be developed for the Class I area pages. As tables and maps are created for each area, the template will be used to create a new webpage for the area, and the appropriate information will be integrated into the webpage.

Task 9: Prepare and Submit Reports and Relevant Data

Documentation and reporting will be conducted as part of this Task. Interim technical memoranda will be submitted at the completion of each technical task discussed above. At the completion of technical tasks, ENVIRON will submit a draft final report detailing the activities conducted during the course of the project. In addition, the draft report will include the following:

- A description of any deviations from the final workplan.
- Examples of the tables and maps generated for each Class I area examined.
- Summary tables and maps for the entire WRAP region, including those described in Tasks 5 and 8.
- A brief description of the project databases, how they were assembled, and their major weaknesses and/or caveats.

The draft final report will be submitted to the Forum for review. Upon receipt of reviewer comments, a Final Report will be submitted which will incorporate any revisions and comments received from the Forum.

At the end of the project, ENVIRON will also submit all relevant data, including databases of emission and activity/surrogate data, digital maps, and GIS files. All workplans, reports, Web pages, and relevant data will be submitted to the WGA in electronic format. Paper copies may be submitted at ENVIRON's discretion.

3.0 PROJECT SCHEDULE AND DELIVERABLES

Figure 3-1 shows the project schedule by month for the study. Work began in mid-November, 2002. The figure shows the anticipated dates of delivery for the deliverables identified in Section 2 of this Work Plan. The schedule is extended slightly from the schedule in the draft work plan because of delays in receiving the revised 1996 base year point source emissions, and also because of the unanticipated time required reach resolution on how to treat the fire emissions.

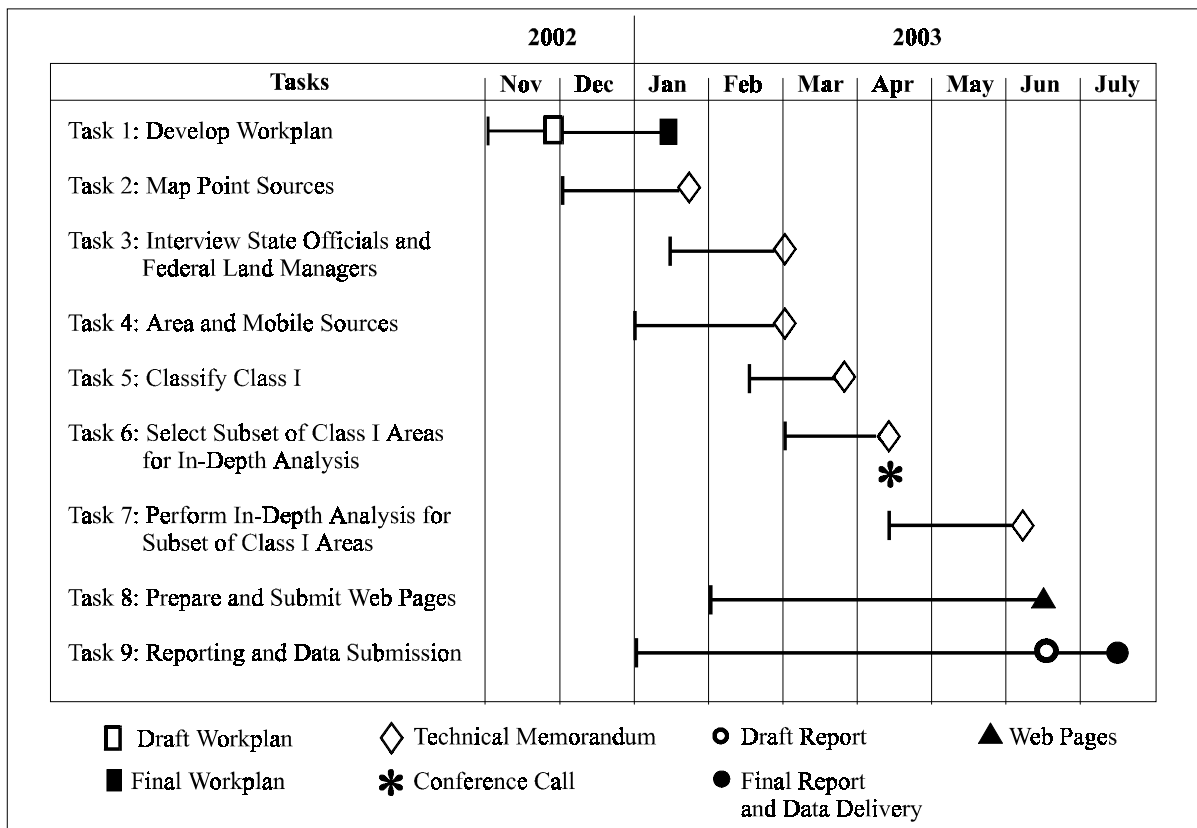


Figure 3-1. Project timeline.

Deliverables for the project and expected deliverable dates are as follows:

- Draft Workplan [this document]: December 4, 2002
- Final Workplan: January 15, 2003
- Task 2 Technical Memorandum describing the development of point source maps, data sources and sample maps including full set of electronic map files: January 24, 2003
- Task 3 Technical Memorandum and informal database summarizing the results of interviews with land managers and state officials: February 28, 2003
- Task 4 Technical Memorandum detailing data sources and development of area and mobile source maps, including full set of maps as GIF files: February 28, 2003
- Task 5 Technical Memorandum documenting the classification of Class I Areas: March 21, 2003

- Task 6 Technical Memorandum documenting the selection of a the subset of Class I area for in-depth analysis: April 4, 2003
- Task 7 Technical Memorandum documenting the data sources and methodologies for the in-depth analysis of Class I subset: June 6, 2003
- Draft Final Report: June 13, 2003
- Web Pages: June 13, 2003
- Final Report: July 11, 2003 (assuming comments on the draft report are received within one week).

APPENDIX A

EMISSIONS SOURCE CATEGORIES AND SURROGATE ASSIGNMENTS

Table A-1. Area source categories SCCs, and spatial surrogates.

SCC	Surrogate	Source Description
2102001000	Population	Stationary Source Fuel CombustionIndustrialAnthracite CoalTotal: All Boiler Types
2102002000	Population	Stationary Source Fuel CombustionIndustrialBituminous/Subbituminous CoalTotal: All Boiler Types
2102004000	Population	Stationary Source Fuel CombustionIndustrialDistillate OilTotal: Boilers and IC Engines
2102005000	Population	Stationary Source Fuel CombustionIndustrialResidual OilTotal: All Boiler Types
2102006000	Population	Stationary Source Fuel CombustionIndustrialNatural GasTotal: Boilers and IC Engines
2102006002	Population	Stationary Source Fuel CombustionIndustrialNatural GasAll IC Engine Types
2102007000	Population	Stationary Source Fuel CombustionIndustrialLiquified Petroleum Gas (LPG)Total: All Boiler Types
2102008000	Population	Stationary Source Fuel CombustionIndustrialWoodTotal: All Boiler Types
2102011000	Population	Stationary Source Fuel CombustionIndustrialKeroseneTotal: All Boiler Types
2103001000	Population	Stationary Source Fuel CombustionCommercial/InstitutionalAnthracite CoalTotal: All Boiler Types
2103002000	Population	Stationary Source Fuel CombustionCommercial/InstitutionalBituminous/Subbituminous CoalTotal: All Boiler Types
2103004000	Population	Stationary Source Fuel CombustionCommercial/InstitutionalDistillate OilTotal: Boilers and IC Engines
2103005000	Population	Stationary Source Fuel CombustionCommercial/InstitutionalResidual OilTotal: All Boiler Types
2103006000	Population	Stationary Source Fuel CombustionCommercial/InstitutionalNatural GasTotal: Boilers and IC Engines
2103007000	Population	Stationary Source Fuel CombustionCommercial/InstitutionalLiquified Petroleum Gas (LPG)Total: All Combustor Types
2103011000	Population	Stationary Source Fuel CombustionCommercial/InstitutionalKeroseneTotal: All Combustor Types
2104001000	Housing	Stationary Source Fuel CombustionResidentialAnthracite CoalTotal: All Combustor Types
2104002000	Housing	Stationary Source Fuel CombustionResidentialBituminous/Subbituminous CoalTotal: All Combustor Types
2104004000	Housing	Stationary Source Fuel CombustionResidentialDistillate OilTotal: All Combustor Types
2104005000	Housing	Stationary Source Fuel CombustionResidentialResidual OilTotal: All Combustor Types
2104006000	Housing	Stationary Source Fuel CombustionResidentialNatural GasTotal: All Combustor Types
2104007000	Housing	Stationary Source Fuel CombustionResidentialLiquified Petroleum Gas (LPG)Total: All Combustor Types
2104008000	Housing	Stationary Source Fuel CombustionResidentialWoodTotal: Woodstoves and Fireplaces
2104008001	Housing	Stationary Source Fuel CombustionResidentialWoodFireplaces: General
2104008010	Housing	Stationary Source Fuel CombustionResidentialWoodWoodstoves: General
2104008030	Housing	Stationary Source Fuel CombustionResidentialWoodCatalytic Woodstoves: General
2104008050	Housing	Stationary Source Fuel CombustionResidentialWoodNon-catalytic Woodstoves: General
2104008051	Housing	Stationary Source Fuel CombustionResidentialWoodNon-catalytic Woodstoves: Conventional
2104008053	Housing	Stationary Source Fuel CombustionResidentialWoodNon-catalytic Woodstoves: Pellet Fired
2199004000	Population	Stationary Source Fuel CombustionTotal Area Source Fuel CombustionDistillate OilTotal: Boilers and IC Engines
2199011000	Population	Stationary Source Fuel CombustionTotal Area Source Fuel CombustionKeroseneTotal: All Heater Types
2301000000	Population	Industrial ProcessesChemical Manufacturing: SIC 28All ProcessesTotal

2301010000	Population	Industrial ProcessesChemical Manufacturing: SIC 28Industrial Inorganic Chemical ManufacturingTotal
2301020000	Population	Industrial ProcessesChemical Manufacturing: SIC 28Process Emissions from Synthetic Fibers Manuf (NAPAP cat. 107)Total
2301030000	Population	Industrial ProcessesChemical Manufacturing: SIC 28Process Emissions from Pharmaceutical Manuf (NAPAP cat. 106)Total
2301040000	Population	Industrial ProcessesChemical Manufacturing: SIC 28Fugitive Emissions from Synthetic Organic Chem Manuf (NAPAP cat. 102)Total
2302002000	Population	Industrial ProcessesFood and Kindred Products: SIC 20Commercial CharbroilingTotal
2302050000	Population	Industrial ProcessesFood and Kindred Products: SIC 20Bakery ProductsTotal
2302070001	Population	Industrial ProcessesFood and Kindred Products: SIC 20Fermentation/BeveragesBreweries
2302070005	Population	Industrial ProcessesFood and Kindred Products: SIC 20Fermentation/BeveragesWineries
2302070010	Population	Industrial ProcessesFood and Kindred Products: SIC 20Fermentation/BeveragesDistilleries
2302080000	Population	Industrial ProcessesFood and Kindred Products: SIC 20Miscellaneous Food and Kindred ProductsTotal
2304000000	Population	Industrial ProcessesSecondary Metal Production: SIC 33All ProcessesTotal
2305000000	Population	Industrial ProcessesMineral Processes: SIC 32All ProcessesTotal
2306000000	Population	Industrial ProcessesPetroleum Refining: SIC 29All ProcessesTotal
2307060000	Population	Industrial ProcessesWood Products: SIC 24Miscellaneous Wood ProductsTotal
2308000000	Population	Industrial ProcessesRubber/Plastics: SIC 30All ProcessesTotal
2310000000	Rural Population	Industrial ProcessesOil and Gas Production: SIC 13All ProcessesTotal: All Processes
2310010000	Rural Population	Industrial ProcessesOil and Gas Production: SIC 13Crude PetroleumTotal: All Processes
2310020000	Rural Population	Industrial ProcessesOil and Gas Production: SIC 13Natural GasTotal: All Processes
2310030000	Rural Population	Industrial ProcessesOil and Gas Production: SIC 13Natural Gas LiquidsTotal: All Processes
2311000100	Housing	Industrial ProcessesConstruction: SIC 15 - 17All ProcessesWind Erosion
2311010000	Housing	Industrial ProcessesConstruction: SIC 15 - 17General Building ConstructionTotal
2311010070	Housing	Industrial ProcessesConstruction: SIC 15 - 17General Building ConstructionVehicle Traffic
2311020000	Housing	Industrial ProcessesConstruction: SIC 15 - 17Heavy ConstructionTotal
2311030000	Housing	Industrial ProcessesConstruction: SIC 15 - 17Road ConstructionTotal
2325000000	Rural Population	Industrial ProcessesMining and Quarrying: SIC 14All ProcessesTotal
2399000000	Population	Industrial ProcessesIndustrial Processes: NECIndustrial Processes: NECTotal
2401001000	Population	Solvent UtilizationSurface CoatingArchitectural CoatingsTotal: All Solvent Types
2401001999	Population	Solvent UtilizationSurface CoatingArchitectural CoatingsSolvents: NEC
2401005000	Population	Solvent UtilizationSurface CoatingAuto Refinishing: SIC 7532Total: All Solvent Types
2401008000	Population	Solvent UtilizationSurface CoatingTraffic MarkingsTotal: All Solvent Types
2401010000	Population	Solvent UtilizationSurface CoatingTextile Products: SIC 22Total: All Solvent Types
2401015000	Population	Solvent UtilizationSurface CoatingFactory Finished Wood: SIC 2426 thru 242Total: All Solvent Types
2401020000	Population	Solvent UtilizationSurface CoatingWood Furniture: SIC 25Total: All Solvent Types
2401025000	Population	Solvent UtilizationSurface CoatingMetal Furniture: SIC 25Total: All Solvent Types

2401030000	Population	Solvent UtilizationSurface CoatingPaper: SIC 26Total: All Solvent Types
2401040000	Population	Solvent UtilizationSurface CoatingMetal Cans: SIC 341Total: All Solvent Types
2401045000	Population	Solvent UtilizationSurface CoatingMetal Coils: SIC 3498Total: All Solvent Types
2401050000	Population	Solvent UtilizationSurface CoatingMiscellaneous Finished Metals: SIC 34 - (341 + 3498)Total: All Solvent Types
2401055000	Population	Solvent UtilizationSurface CoatingMachinery and Equipment: SIC 35Total: All Solvent Types
2401060000	Population	Solvent UtilizationSurface CoatingLarge Appliances: SIC 363Total: All Solvent Types
2401065000	Population	Solvent UtilizationSurface CoatingElectronic and Other Electrical: SIC 36 - 363Total: All Solvent Types
2401070000	Population	Solvent UtilizationSurface CoatingMotor Vehicles: SIC 371Total: All Solvent Types
2401075000	Population	Solvent UtilizationSurface CoatingAircraft: SIC 372Total: All Solvent Types
2401080000	Population	Solvent UtilizationSurface CoatingMarine: SIC 373Total: All Solvent Types
2401085000	Population	Solvent UtilizationSurface CoatingRailroad: SIC 374Total: All Solvent Types
2401090000	Population	Solvent UtilizationSurface CoatingMiscellaneous ManufacturingTotal: All Solvent Types
2401100000	Population	Solvent UtilizationSurface CoatingIndustrial Maintenance CoatingsTotal: All Solvent Types
2401200000	Population	Solvent UtilizationSurface CoatingOther Special Purpose CoatingsTotal: All Solvent Types
2401990000	Population	Solvent UtilizationSurface CoatingAll Surface Coating CategoriesTotal: All Solvent Types
2415000999	Population	Solvent UtilizationDegreasingAll Processes/All IndustriesSolvents: NEC
2415005000	Population	Solvent UtilizationDegreasingFurniture and Fixtures (SIC 25): All ProcessesTotal: All Solvent Types
2415010000	Population	Solvent UtilizationDegreasingPrimary Metal Industries (SIC 33): All ProcessesTotal: All Solvent Types
2415020000	Population	Solvent UtilizationDegreasingFabricated Metal Products (SIC 34): All ProcessesTotal: All Solvent Types
2415025000	Population	Solvent UtilizationDegreasingIndustrial Machinery and Equipment (SIC 35): All ProcessesTotal: All Solvent Types
2415030000	Population	Solvent UtilizationDegreasingElectronic and Other Elec. (SIC 36): All ProcessesTotal: All Solvent Types
2415035000	Population	Solvent UtilizationDegreasingTransportation Equipment (SIC 37): All ProcessesTotal: All Solvent Types
2415040000	Population	Solvent UtilizationDegreasingInstruments and Related Products (SIC 38): All ProcessesTotal: All Solvent Types
2415045000	Population	Solvent UtilizationDegreasingMiscellaneous Manufacturing (SIC 39): All ProcessesTotal: All Solvent Types
2415045999	Population	Solvent UtilizationDegreasingMiscellaneous Manufacturing (SIC 39): All ProcessesSolvents: NEC
2415060000	Population	Solvent UtilizationDegreasingMiscellaneous Repair Services (SIC 76): All ProcessesTotal: All Solvent Types
2415065000	Population	Solvent UtilizationDegreasingAuto Repair Services (SIC 75): All ProcessesTotal: All Solvent Types
2415100000	Population	Solvent UtilizationDegreasingAll Industries: Open Top DegreasingTotal: All Solvent Types
2415105000	Population	Solvent UtilizationDegreasingFurniture and Fixtures (SIC 25): Open Top DegreasingTotal: All Solvent Types
2415110000	Population	Solvent UtilizationDegreasingPrimary Metal Industries (SIC 33): Open Top DegreasingTotal: All Solvent Types
2415120000	Population	Solvent UtilizationDegreasingFabricated Metal Products (SIC 34): Open Top DegreasingTotal: All Solvent Types
2415125000	Population	Solvent UtilizationDegreasingIndustrial Machinery and Equipment (SIC 35): Open Top DegreasingTotal: All Solvent Types
2415130000	Population	Solvent UtilizationDegreasingElectronic and Other Elec. (SIC 36): Open Top DegreasingTotal: All Solvent Types
2415135000	Population	Solvent UtilizationDegreasingTransportation Equipment (SIC 37): Open Top DegreasingTotal: All Solvent Types

2415140000	Population	Solvent UtilizationDegreasingInstruments and Related Products (SIC 38): Open Top DegreasingTotal: All Solvent Types
2415145000	Population	Solvent UtilizationDegreasingMiscellaneous Manufacturing (SIC 39): Open Top DegreasingTotal: All Solvent Types
2415200000	Population	Solvent UtilizationDegreasingAll Industries: Conveyerized DegreasingTotal: All Solvent Types
2415205000	Population	Solvent UtilizationDegreasingFurniture and Fixtures (SIC 25): Conveyerized DegreasingTotal: All Solvent Types
2415300000	Population	Solvent UtilizationDegreasingAll Industries: Cold CleaningTotal: All Solvent Types
2415305000	Population	Solvent UtilizationDegreasingFurniture and Fixtures (SIC 25): Cold CleaningTotal: All Solvent Types
2415310000	Population	Solvent UtilizationDegreasingPrimary Metal Industries (SIC 33): Cold CleaningTotal: All Solvent Types
2415320000	Population	Solvent UtilizationDegreasingFabricated Metal Products (SIC 34): Cold CleaningTotal: All Solvent Types
2415325000	Population	Solvent UtilizationDegreasingIndustrial Machinery and Equipment (SIC 35): Cold CleaningTotal: All Solvent Types
2415330000	Population	Solvent UtilizationDegreasingElectronic and Other Elec. (SIC 36): Cold CleaningTotal: All Solvent Types
2415335000	Population	Solvent UtilizationDegreasingTransportation Equipment (SIC 37): Cold CleaningTotal: All Solvent Types
2415340000	Population	Solvent UtilizationDegreasingInstruments and Related Products (SIC 38): Cold CleaningTotal: All Solvent Types
2415345000	Population	Solvent UtilizationDegreasingMiscellaneous Manufacturing (SIC 39): Cold CleaningTotal: All Solvent Types
2415355000	Population	Solvent UtilizationDegreasingAutomotive Dealers (SIC 55): Cold CleaningTotal: All Solvent Types
2415360000	Population	Solvent UtilizationDegreasingAuto Repair Services (SIC 75): Cold CleaningTotal: All Solvent Types
2415365000	Population	Solvent UtilizationDegreasingMiscellaneous Repair Services (SIC 76): Cold CleaningTotal: All Solvent Types
2420000000	Population	Solvent UtilizationDry CleaningAll ProcessesTotal: All Solvent Types
2420000055	Population	Solvent UtilizationDry CleaningAll ProcessesPerchloroethylene
2420000370	Population	Solvent UtilizationDry CleaningAll ProcessesSpecial Naphthas
2420000999	Population	Solvent UtilizationDry CleaningAll ProcessesSolvents: NEC
2420010055	Population	Solvent UtilizationDry CleaningCommercial/Industrial CleanersPerchloroethylene
2420010370	Population	Solvent UtilizationDry CleaningCommercial/Industrial CleanersSpecial Naphthas
2420020055	Population	Solvent UtilizationDry CleaningCoin-operated CleanersPerchloroethylene
2425000000	Population	Solvent UtilizationGraphic ArtsAll ProcessesTotal: All Solvent Types
2430000000	Population	Solvent UtilizationRubber/PlasticsAll ProcessesTotal: All Solvent Types
2440000000	Population	Solvent UtilizationMiscellaneous IndustrialAll ProcessesTotal: All Solvent Types
2440020000	Population	Solvent UtilizationMiscellaneous IndustrialAdhesive (Industrial) ApplicationTotal: All Solvent Types
2460000000	Population	Solvent UtilizationMiscellaneous Non-industrial: Consumer and CommercialAll ProcessesTotal: All Solvent Types
2460500000	Population	Solvent UtilizationMiscellaneous Non-industrial: Consumer and CommercialAll Coatings and Related ProductsTotal: All Solvent Types
2461020000	Population	Solvent UtilizationMiscellaneous Non-industrial: CommercialAsphalt Application: All ProcessesTotal: All Solvent Types
2461021000	Population	Solvent UtilizationMiscellaneous Non-industrial: CommercialCutback AsphaltTotal: All Solvent Types
2461022000	Population	Solvent UtilizationMiscellaneous Non-industrial: CommercialEmulsified AsphaltTotal: All Solvent Types
2461023000	Population	Solvent UtilizationMiscellaneous Non-industrial: CommercialAsphalt RoofingTotal: All Solvent Types
2461600000	Population	#N/A

2461800000	Population	Solvent UtilizationMiscellaneous Non-industrial: CommercialPesticide Application: All ProcessesTotal: All Solvent Types
2461850000	Agriculture	Solvent UtilizationMiscellaneous Non-industrial: CommercialPesticide Application: AgriculturalAll Processes
2465000000	Population	Solvent UtilizationMiscellaneous Non-industrial: ConsumerAll Products/ProcessesTotal: All Solvent Types
2465100000	Population	Solvent UtilizationMiscellaneous Non-industrial: ConsumerPersonal Care ProductsTotal: All Solvent Types
2465200000	Population	Solvent UtilizationMiscellaneous Non-industrial: ConsumerHousehold ProductsTotal: All Solvent Types
2465400000	Population	Solvent UtilizationMiscellaneous Non-industrial: ConsumerAutomotive Aftermarket ProductsTotal: All Solvent Types
2465600000	Population	Solvent UtilizationMiscellaneous Non-industrial: ConsumerAdhesives and SealantsTotal: All Solvent Types
2465800000	Population	Solvent UtilizationMiscellaneous Non-industrial: ConsumerPesticide ApplicationTotal: All Solvent Types
2465900000	Population	Solvent UtilizationMiscellaneous Non-industrial: ConsumerMiscellaneous Products: NECTotal: All Solvent Types
2495000000	Population	Solvent UtilizationAll Solvent User CategoriesAll ProcessesTotal: All Solvent Types
2501000000	Rural Population	Storage and TransportPetroleum and Petroleum Product StorageAll Storage Types: Breathing LossTotal: All Products
2501050000	Rural Population	Storage and TransportPetroleum and Petroleum Product StorageBulk Stations/Terminals: Breathing LossTotal: All Products
2501050120	Rural Population	Storage and TransportPetroleum and Petroleum Product StorageBulk Stations/Terminals: Breathing LossGasoline
2501060000	Population	Storage and TransportPetroleum and Petroleum Product StorageGasoline Service StationsTotal: All Gasoline/All Processes
2501060050	Population	Storage and TransportPetroleum and Petroleum Product StorageGasoline Service StationsStage 1: Total
2501060052	Population	Storage and TransportPetroleum and Petroleum Product StorageGasoline Service StationsStage 1: Splash Filling
2501060053	Population	Storage and TransportPetroleum and Petroleum Product StorageGasoline Service StationsStage 1: Balanced Submerged Filling
2501060100	Population	Storage and TransportPetroleum and Petroleum Product StorageGasoline Service StationsStage 2: Total
2501060101	Population	Storage and TransportPetroleum and Petroleum Product StorageGasoline Service StationsStage 2: Displacement Loss/Uncontrolled
2501060102	Population	Storage and TransportPetroleum and Petroleum Product StorageGasoline Service StationsStage 2: Displacement Loss/Controlled
2501060103	Population	Storage and TransportPetroleum and Petroleum Product StorageGasoline Service StationsStage 2: Spillage
2501060200	Population	Storage and TransportPetroleum and Petroleum Product StorageGasoline Service StationsUnderground Tank: Total
2501060201	Population	Storage and TransportPetroleum and Petroleum Product StorageGasoline Service StationsUnderground Tank: Breathing and Emptying
2501995000	Rural Population	Storage and TransportPetroleum and Petroleum Product StorageAll Storage Types: Working LossTotal: All Products
2505000120	Population	Storage and TransportPetroleum and Petroleum Product TransportAll Transport TypesGasoline
2505010000	Railroads	Storage and TransportPetroleum and Petroleum Product TransportRail Tank CarTotal: All Products
2505020030	Ports	Storage and TransportPetroleum and Petroleum Product TransportMarine VesselCrude Oil
2505020060	Ports	Storage and TransportPetroleum and Petroleum Product TransportMarine VesselResidual Oil
2505020090	Ports	Storage and TransportPetroleum and Petroleum Product TransportMarine VesselDistillate Oil
2505020120	Ports	Storage and TransportPetroleum and Petroleum Product TransportMarine VesselGasoline
2505020121	#N/A	#N/A
2505020150	Ports	Storage and TransportPetroleum and Petroleum Product TransportMarine VesselJet Naphtha
2505030000	Population	Storage and TransportPetroleum and Petroleum Product TransportTruckTotal: All Products
2505030120	Population	Storage and TransportPetroleum and Petroleum Product TransportTruckGasoline

2601010000	Population	Waste Disposal, Treatment, and Recovery	On-site Incineration	Industrial	Total
2601020000	Population	Waste Disposal, Treatment, and Recovery	On-site Incineration	Commercial/Institutional	Total
2601030000	Housing	Waste Disposal, Treatment, and Recovery	On-site Incineration	Residential	Total
2610000000	Rural Population	Waste Disposal, Treatment, and Recovery	Open Burning	All Categories	Total
2610010000	Rural Population	Waste Disposal, Treatment, and Recovery	Open Burning	Industrial	Total
2610020000	Rural Population	Waste Disposal, Treatment, and Recovery	Open Burning	Commercial/Institutional	Total
2610030000	Housing	Waste Disposal, Treatment, and Recovery	Open Burning	Residential	Household Waste (use 26-10-000-xxx for Yard Wastes)
2620000000	Rural Population	Waste Disposal, Treatment, and Recovery	Landfills	All Categories	Total
2620030000	Rural Population	Waste Disposal, Treatment, and Recovery	Landfills	Municipal	Total
2630000000	Rural Population	Waste Disposal, Treatment, and Recovery	Wastewater Treatment	All Categories	Total Processed
2630020000	Rural Population	Waste Disposal, Treatment, and Recovery	Wastewater Treatment	Public Owned	Total Processed
2640000000	Rural Population	Waste Disposal, Treatment, and Recovery	TSDFs	All TSDF Types	Total: All Processes
2640000004	Rural Population	Waste Disposal, Treatment, and Recovery	TSDFs	All TSDF Types	Transfer, Storage, and Handling
2660000000	Population	Waste Disposal, Treatment, and Recovery	Leaking Underground Storage Tanks	Leaking Underground Storage Tanks	Total: All Storage Types
2710020030	Rural Population	Natural Sources	Agriculture Production - Livestock	Horses and Ponies Composite	Total
2730050000	Rural Population	Natural Sources	Geogenic	Geyser/Geothermal	Total
2801000000	Agriculture	Miscellaneous Area Sources	Agriculture Production - Crops	Agriculture - Crops	Total
2801000001	Agriculture	Miscellaneous Area Sources	Agriculture Production - Crops	Agriculture - Crops	Land Breaking
2801000003	Agriculture	Miscellaneous Area Sources	Agriculture Production - Crops	Agriculture - Crops	Tilling
2801000005	Agriculture	Miscellaneous Area Sources	Agriculture Production - Crops	Agriculture - Crops	Harvesting
2801000008	Agriculture	Miscellaneous Area Sources	Agriculture Production - Crops	Agriculture - Crops	Transport
2801501000	Agriculture	Miscellaneous Area Sources	Agriculture Production - Crops	Agricultural Propaning - tractor-pulled burners to burn stubble only	Total, all crop types
2801502000	Agriculture	Miscellaneous Area Sources	Agriculture Production - Crops	Agricultural Stack Burning - straw stacks moved from field for burning	Total, all crop types
2801520000	Agriculture	Miscellaneous Area Sources	Agriculture Production - Crops	Orchard Heaters	Total, all fuels
2801520004	Agriculture	Miscellaneous Area Sources	Agriculture Production - Crops	Orchard Heaters	Diesel
2801700001	Agriculture	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Anhydrous Ammonia
2801700002	Agriculture	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Aqua Ammonia
2801700003	Agriculture	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Nitrogen Solutions
2801700004	Agriculture	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Urea
2801700005	Agriculture	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Ammonium Nitrate
2801700006	Agriculture	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Ammonium Sulfate
2801700007	Agriculture	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Ammonium Thiosulfate
2801700008	Agriculture	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Other Straight Nitrogen
2801700009	Agriculture	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Ammonium Phosphates

2801700010	Agriculture	Miscellaneous Area SourcesAgriculture Production - CropsFertilizer ApplicationN-P-K
2805000000	Agriculture	Miscellaneous Area SourcesAgriculture Production - LivestockAgriculture - LivestockTotal
2805001000	Agriculture	Miscellaneous Area SourcesAgriculture Production - LivestockBeef Cattle FeedlotsTotal (also see 2805020000)
2805020000	Agriculture	Miscellaneous Area SourcesAgriculture Production - LivestockCattle and Calves CompositeTotal
2805025000	Agriculture	Miscellaneous Area SourcesAgriculture Production - LivestockHogs and Pigs CompositeTotal
2805030000	Agriculture	Miscellaneous Area SourcesAgriculture Production - LivestockPoultry and Chickens CompositeTotal
2805035000	Agriculture	Miscellaneous Area SourcesAgriculture Production - LivestockHorses and Ponies CompositeTotal
2805040000	Agriculture	Miscellaneous Area SourcesAgriculture Production - LivestockSheep and Lambs CompositeTotal
2805045001	Agriculture	Miscellaneous Area SourcesAgriculture Production - LivestockGoatsTotal
2810010000	Population	Miscellaneous Area SourcesOther CombustionHuman PerspirationTotal
2810025000	Housing	Miscellaneous Area SourcesOther CombustionCharcoal GrillingTotal
2810030000	Housing	Miscellaneous Area SourcesOther CombustionStructure FiresTotal
2810050000	Housing	Miscellaneous Area SourcesOther CombustionMotor Vehicle FiresTotal
2830000000	Rural Population	Miscellaneous Area SourcesCatastrophic/Accidental ReleasesAll Catastrophic/Accidental ReleasesTotal

Table A-2. Off-road mobile source categories, SCCs, and spatial surrogates.

SCC	Spatial Surrogate	Source Description
2200005000	Agricultural land	Agricultural Equipment
2200006000	Urban land	Commercial Equipment
2200002000	Population	Construction and Mining Equipment
2200003000	Population	Industrial Equipment
2200004000	Urban land	Lawn and Garden Equipment (Com)
2200004001	Population	Lawn and Garden Equipment (Res)
2200007000	Forest land	Logging Equipment
2282000000	Water	Pleasure Craft
2285004000	Railroads	Railroad Equipment
2200001000	Inverse population	Recreational Equipment
2285002005	Railroads	Locomotives

Table A-3. On-road mobile source categories, SCCs, and spatial surrogates (non-California states).

SCC	Spatial Surrogate	Vehicle Class	Facility Type
2201001110	Rural primary roads	LDGV	Rural Interstate
2201001130	Rural primary roads	LDGV	Rural Other Principal Arterial
2201001150	Rural secondary roads	LDGV	Rural Minor Arterial
2201001170	Rural primary roads	LDGV	Rural Major Collector
2201001190	Rural secondary roads	LDGV	Rural Minor Collector
2201001210	Rural secondary roads	LDGV	Rural Local
2201001230	Urban primary roads	LDGV	Urban Interstate
2201001250	Urban primary roads	LDGV	Urban Other Freeways and Expressways
2201001270	Urban primary roads	LDGV	Urban Other Principal Arterial
2201001290	Urban secondary roads	LDGV	Urban Minor Arterial
2201001310	Urban secondary roads	LDGV	Urban Collector
2201001330	Urban secondary roads	LDGV	Urban Local
2201020110	Rural primary roads	LDGT1	Rural Interstate
2201020130	Rural primary roads	LDGT1	Rural Other Principal Arterial
2201020150	Rural secondary roads	LDGT1	Rural Minor Arterial
2201020170	Rural primary roads	LDGT1	Rural Major Collector
2201020190	Rural secondary roads	LDGT1	Rural Minor Collector
2201020210	Rural secondary roads	LDGT1	Rural Local
2201020230	Urban primary roads	LDGT1	Urban Interstate
2201020250	Urban primary roads	LDGT1	Urban Other Freeways and Expressways
2201020270	Urban primary roads	LDGT1	Urban Other Principal Arterial
2201020290	Urban secondary roads	LDGT1	Urban Minor Arterial
2201020310	Urban secondary roads	LDGT1	Urban Collector
2201020330	Urban secondary roads	LDGT1	Urban Local
2201040110	Rural primary roads	LDGT2	Rural Interstate
2201040130	Rural primary roads	LDGT2	Rural Other Principal Arterial
2201040150	Rural secondary roads	LDGT2	Rural Minor Arterial
2201040170	Rural primary roads	LDGT2	Rural Major Collector
2201040190	Rural secondary roads	LDGT2	Rural Minor Collector
2201040210	Rural secondary roads	LDGT2	Rural Local
2201040230	Urban primary roads	LDGT2	Urban Interstate
2201040250	Urban primary roads	LDGT2	Urban Other Freeways and Expressways
2201040270	Urban primary roads	LDGT2	Urban Other Principal Arterial
2201040290	Urban secondary roads	LDGT2	Urban Minor Arterial
2201040310	Urban secondary roads	LDGT2	Urban Collector
2201040330	Urban secondary roads	LDGT2	Urban Local

SCC	Spatial Surrogate	Vehicle Class	Facility Type
2201070110	Rural primary roads	HDGV	Rural Interstate
2201070130	Rural primary roads	HDGV	Rural Other Principal Arterial
2201070150	Rural secondary roads	HDGV	Rural Minor Arterial
2201070170	Rural primary roads	HDGV	Rural Major Collector
2201070190	Rural secondary roads	HDGV	Rural Minor Collector
2201070210	Rural secondary roads	HDGV	Rural Local
2201070230	Urban primary roads	HDGV	Urban Interstate
2201070250	Urban primary roads	HDGV	Urban Other Freeways and Expressways
2201070270	Urban primary roads	HDGV	Urban Other Principal Arterial
2201070290	Urban secondary roads	HDGV	Urban Minor Arterial
2201070310	Urban secondary roads	HDGV	Urban Collector
2201070330	Urban secondary roads	HDGV	Urban Local
2201080110	Rural primary roads	MC	Rural Interstate
2201080130	Rural primary roads	MC	Rural Other Principal Arterial
2201080150	Rural secondary roads	MC	Rural Minor Arterial
2201080170	Rural primary roads	MC	Rural Major Collector
2201080190	Rural secondary roads	MC	Rural Minor Collector
2201080210	Rural secondary roads	MC	Rural Local
2201080230	Urban primary roads	MC	Urban Interstate
2201080250	Urban primary roads	MC	Urban Other Freeways and Expressways
2201080270	Urban primary roads	MC	Urban Other Principal Arterial
2201080290	Urban secondary roads	MC	Urban Minor Arterial
2201080310	Urban secondary roads	MC	Urban Collector
2201080330	Urban secondary roads	MC	Urban Local
2230001110	Rural primary roads	LDDV	Rural Interstate
2230001130	Rural primary roads	LDDV	Rural Other Principal Arterial
2230001150	Rural secondary roads	LDDV	Rural Minor Arterial
2230001170	Rural primary roads	LDDV	Rural Major Collector
2230001190	Rural secondary roads	LDDV	Rural Minor Collector
2230001210	Rural secondary roads	LDDV	Rural Local
2230001230	Urban primary roads	LDDV	Urban Interstate
2230001250	Urban primary roads	LDDV	Urban Other Freeways and Expressways
2230001270	Urban primary roads	LDDV	Urban Other Principal Arterial
2230001290	Urban secondary roads	LDDV	Urban Minor Arterial
2230001310	Urban secondary roads	LDDV	Urban Collector
2230001330	Urban secondary roads	LDDV	Urban Local
2230060110	Rural primary roads	LDDT	Rural Interstate
2230060130	Rural primary roads	LDDT	Rural Other Principal Arterial
2230060150	Rural secondary roads	LDDT	Rural Minor Arterial
2230060170	Rural primary roads	LDDT	Rural Major Collector
2230060190	Rural secondary roads	LDDT	Rural Minor Collector
2230060210	Rural secondary roads	LDDT	Rural Local
2230060230	Urban primary roads	LDDT	Urban Interstate
2230060250	Urban primary roads	LDDT	Urban Other Freeways and Expressways
2230060270	Urban primary roads	LDDT	Urban Other Principal Arterial
2230060290	Urban secondary roads	LDDT	Urban Minor Arterial
2230060310	Urban secondary roads	LDDT	Urban Collector
2230060330	Urban secondary roads	LDDT	Urban Local
2230070110	Rural primary roads	HDDV	Rural Interstate
2230070130	Rural primary roads	HDDV	Rural Other Principal Arterial
2230070150	Rural secondary roads	HDDV	Rural Minor Arterial
2230070170	Rural primary roads	HDDV	Rural Major Collector
2230070190	Rural secondary roads	HDDV	Rural Minor Collector

SCC	Spatial Surrogate	Vehicle Class	Facility Type
2230070210	Rural secondary roads	HDDV	Rural Local
2230070230	Urban primary roads	HDDV	Urban Interstate
2230070250	Urban primary roads	HDDV	Urban Other Freeways and Expressways
2230070270	Urban primary roads	HDDV	Urban Other Principal Arterial
2230070290	Urban secondary roads	HDDV	Urban Minor Arterial
2230070310	Urban secondary roads	HDDV	Urban Collector
2230070330	Urban secondary roads	HDDV	Urban Local
2294000000	Urban & rural primary, urban secondary roads	N/A	Paved road dust
2296000000	Rural secondary roads	N/A	Unpaved road dust

Table A-4. On-road mobile source categories SCCs, and spatial surrogates (California only).

SCC	Spatial Surrogate	Vehicle Class
2230070000	Population weighted roadways	HDDV
2230060000	Population weighted roadways	LDDV
2230000000	Population weighted roadways	LDDV
2201070000	Population weighted roadways	HDGV
2201020000	Population weighted roadways	LDGT1
2201040000	Population weighted roadways	LDGT2
2201000000	Population weighted roadways	LDGV
2201080000	Population weighted roadways	MC
2294000000	Urban & rural primary, urban secondary roads	Paved road dust
2296000000	Rural secondary roads	Unpaved road dust

APPENDIX B

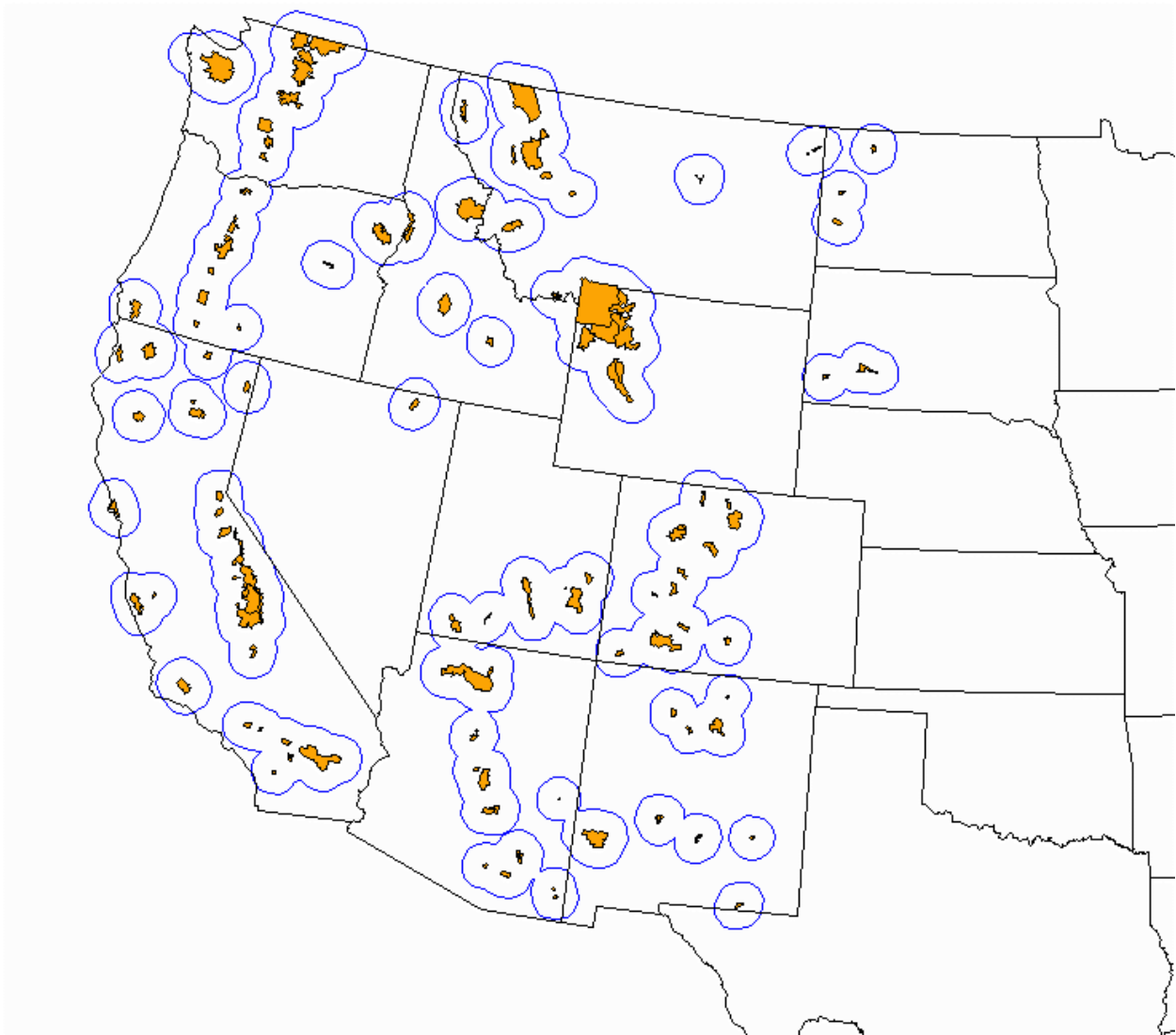
WEB PAGE LAYOUT

[Main page]

[Insert text here describing purpose of the project, and providing link to the Forum web page and to the ENVIRON project final report]

WRAP Class I Areas

Place the mouse over an area to move to a web page for the area with maps and emissions summary tables. [Map is not yet final.]



List of Class I Areas [each will be a link]

[Area One](#)

[Area Two](#)

[Area Three](#)

[Area Four](#)

Etc.

[Sample Class I Area Page]

Class I area: [area name(s)]

Maps for [Class I area name(s)]:

- Base Map
- [Gridded land use/land cover](#) [example shown below]
- Gridded Population Base map with point source SO_x emissions
- Base map with point source PM₁₀ emissions
- Base map with point source NO_x emissions
- Base map with point source VOC emissions
- Base map with point source NH₃ emissions
- Base map with point source CO emissions

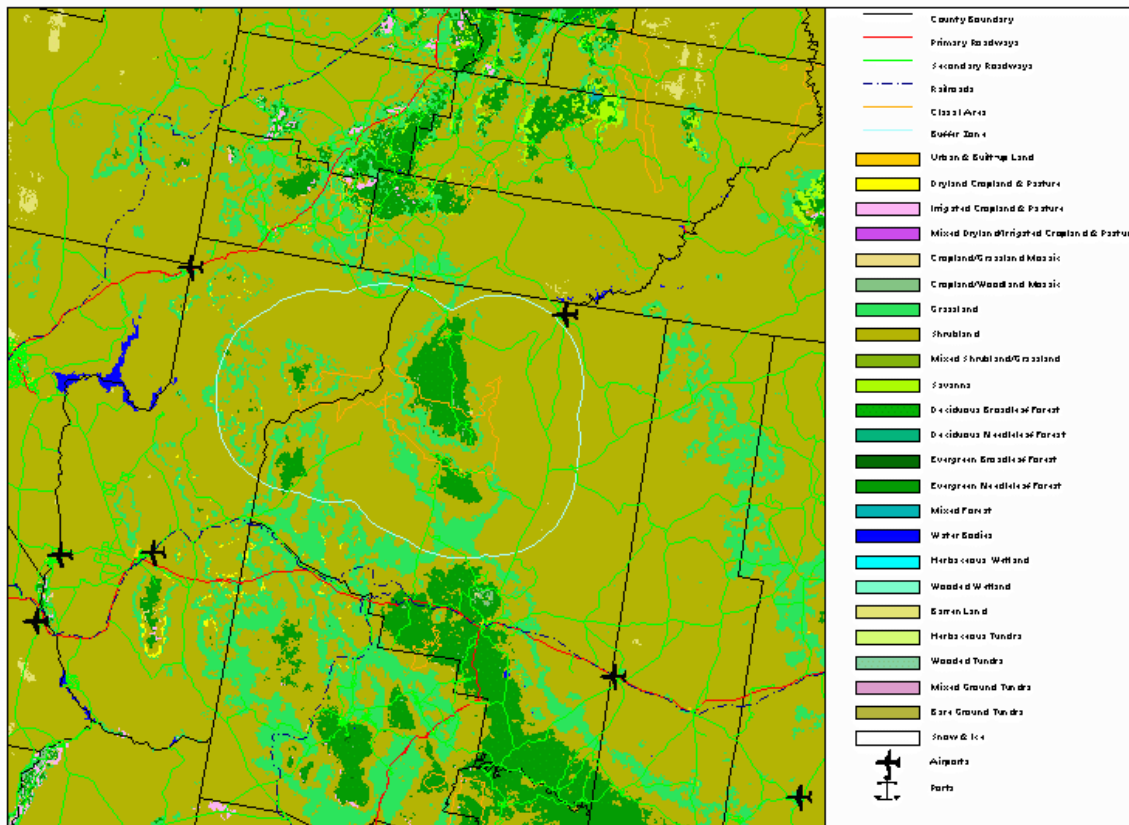
Emissions within the [Class I area(s) name] buffer zone:

- [Table of estimated point source emissions by county](#) [example shown below]
- Table of estimated area source emissions by county
- Table of estimated on-road mobile source emissions by county
- Table of off-road mobile source emissions by county

[Download](#) all tables and maps as a Zip file.

Maps for [Class I area name(s)]:

Land Use/Land Cover



[more maps]

Tables

Estimated Point Source Emissions by County

PT_ID	ID	PLANT_ID	FIPS	PLANT NAME	Longitud	Latitude	NOX (tpy)
1	1	34	4001	'TRANSWESTERN PIPELINE COMPANY'	-109.39	35.56	1199.79
2	2	35	4001	'EL PASO NATURAL GAS CO. ENVIRONMENTAL AF'	-109.50	35.61	3613.28
3	3	59	4001	'Salt River Project (SRP) Coronado Genera'	-109.27	34.57	10305.25
9	9	4	4005	'NAVAJO'	-111.39	36.91	25244.60
10	10	133	4005	'Transwestern Pipeline Company Flagstaff'	-112.04	35.63	161.01
11	11	137	4005	'TRANSWESTERN PIPELINE COMPANY'	-110.85	35.30	1319.87
12	12	565	4005	'EL PASO NATURAL GAS CO. ENVIRONMENTAL AF'	-111.09	35.30	2556.36
13	13	626	4005	'El Paso Natural Gas Company Flagstaff Co'	-111.55	35.22	1068.21
14	14	873	4005	'El Paso Natural Gas Company Williams Com'	-112.06	35.31	1508.40
15	15	1678	4005	'Wisconsin Tissue Mills Inc. Flagstaff PI'	-111.63	35.19	33.97
23	23	1042	4012	'El Paso Natural Gas Company Alamo Lake C'	-113.61	34.07	43.74
179	179	131	4015	'Transwestern Pipeline Company Kingman'	-113.35	35.20	39.68
180	180	229	4015	'Ford Motor Company Arizona Proving Groun'	-114.13	34.87	138.77
181	181	522	4015	'El Paso Natural Gas Company Hackberry Co'	-113.70	35.17	298.20
182	182	815	4015	'Mojave Pipeline Operating Company Topock'	-114.46	34.72	48.44
183	183	1041	4015	'El Paso Natural Gas Company Dutch Flat C'	-113.99	34.55	96.54
184	184	75	4017	'EPNG-NAVAJO STATION'	-109.87	35.53	4176.88
185	185	397	4017	'Arizona Public Service Company (APS) Cho'	-110.29	34.94	10133.04
186	186	613	4017	'EL PASO NATURAL GAS CO. ENVIRONMENTAL AF'	-110.30	35.33	537.29
225	225	18	4025	'Sturm Ruger & Co. Inc. Prescott Operatio'	-112.42	34.65	4.17
226	226	405	4025	'CYPRUS BAGDAD COPPER CORP Cyprus Bagdad'	-113.23	34.58	85.87
23719	23721	3	49017	'ESCALANTE MICRO ENR.'	-111.60	37.83	2.07
23829	23831	18	49037	'Mustang Unit'	-109.78	37.68	3.04
23906	23908	11	49053	'Plant #12 (Geneva Slag Operations)'	-113.65	37.12	24.87
23907	23909	11	49053	'St. George City Power Plant'	-113.66	37.12	24.87

[more tables]
