Creating a Tribal Source and Emission Inventory Out of Thin Air: A Comprehensive Approach Using Primary and Secondary Data

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ABSTRACT

Tribes and other entities sometimes face difficulty assembling necessary information for a source and emission inventory. This paper offers a comprehensive approach to describing the air quality for a tribe's airshed addressing both on and off-reservation sources using existing databases. The approach is general and straightforward. The result is a useful, high quality picture of the air quality for a region. This paper describes a variety of primary and secondary data sources and analytic methods, including:

- On-line federal and state datasets such as EPA AIRS, IMPROVE and the California Air Resources Board with methods for simple, informative tables, their uses, limitations, and estimation methods for the tribal portion of emissions.
- Regional data from air pollution districts include permit data and monitoring information with data reduction methods for complex series.
- Primary data collection such as surveys of tribal members, with appropriate data collection methods and analytic techniques.

Sample results are included for each data type.

The source and emission inventory for the Bishop Paiute Tribe was compiled into a report, and has been widely used, including determining the need for monitoring by the tribe, informing the Tribal Council of the overall picture of air quality for the reservation, and for environmental assessments for a number of projects. The local air pollution control district has also used the report.

INTRODUCTION

Developing a source and emission inventory can be a daunting task for tribal air professionals who may not only be new to the job, but new to the field. The process need not be complicated nor intimidating. This paper describes the process of creating a source and emission inventory for the Bishop Paiute Tribe, using an assortment of information. While not all types of information may be available to all tribes, many are available to most tribes and the process can be generalized to alternative types of information.

The primary goal of a source and emission inventory is creating a useful document that the tribe can use for decision-making. The document should help with planning, both for the air program itself and for development on the reservation. A secondary goal is a document that is useful to outside entities that are interested in reservation air quality.

The ingredients that were used for the Bishop Tribe's Air Quality Report are described in the report's table of contents, whose major headings are listed below with a brief description of the information contained in each section. The focus moves from the region, to relevant local data, and finally, zeroes in on the reservation itself. This approach assures that appropriate context is provided so that the results of the more detailed inventory for the reservation can be interpreted.

- EXECUTIVE SUMMARY: This section should be a convenient summary for policy-makers, like the Tribal Council. It should contain information from each of the main sections of the report. The most important summary data should be shown and priorities should be listed. (See Section 9 on

summary emission inventory results.) The executive summary should be not longer than one or two pages.

- ACKNOWLEDGEMENTS: Most emission inventories require help from a lot of people. This is an opportunity to thank them.

- BACKGROUND, LOCATION AND HISTORY: This section should provide general information about the setting, with a focus on air quality, including:
  - Where the tribe / reservation is located with a map of the reservation and a regional map. These can be very simple. (See Section 1 on maps.)
  - Meteorological information, readily available from websites. (See Section 2 on weather.)
  - A brief discussion of common pollutants and the reasons for monitoring for the general audience.
  - General information on the sources and types of pollutants in the region along with a summary of any non-attainment areas and recent exceedances. (See Section 3 on helpful websites, and Section 4 on data from air pollution control districts.) The tribe / reservation should be sited relative to surrounding jurisdictions that are concerned with air quality. (See Section 1 on maps.)

- ANALYSES OF EXISTING AIR QUALITY DATA FROM NEIGHBORING JURISDICTIONS: State and local air pollution control offices have had the responsibility of monitoring air quality for a long time. Generally, they have volumes of data and trained technical staff. They can be an invaluable resource for any organization starting an air program. Usually, they have conducted emission inventories and are willing to supply reports and data just for the asking. (See Section 4 on data from air pollution control districts.) Alternatively, much of the data is available from the US EPA website, but access may not be as convenient. (See Section 3 on helpful websites.) State and Federal land managers may also have interesting information that they are willing to share.

- IMPACTS OF NEIGHBORING SOURCES ON TRIBAL AIR QUALITY: This section of the report should describe the most important off-reservation sources that are likely to impact the tribe / reservation.
  - Large area sources should be described individually, and any information on emissions presented. Typically this information is available from local air pollution control offices or relevant land managers. (See Section 4 on data from air pollution control districts.)
  - Permit data will provide emissions information from a variety of industrial and commercial sources. Generally they contain location information as well as estimates of emissions. Maps are useful in showing the location relative to the tribe / reservation. (See Section 1 on maps.)
  - Vehicle emissions or controlled burns may be additional important sources that can be evaluated from state databases or using data from the air pollution control district. (See Section 3 on useful websites and Section 4 on data from air pollution control districts.)

- SOURCE INVENTORY OF ALL SOURCES WITHIN THE TRIBAL JURISDICTION AND PRIORITIZATION FOR FUTURE REGULATION: This is a listing of sources. It is a simple assessment of the most important sources on the reservation. For future planning purposes, it is useful to prioritize the list based on the magnitude of the source, the health risk and / or amenability to policy intervention and / or regulation. In the case of the Bishop Paiute Reservation, only area sources were identified, but a more comprehensive inventory might want to segregate sources according to type. (See Section 5 on identifying sources.)

- EMISSION INVENTORY: This section contains the actual calculations of emissions from the sources identified in the previous section. Emissions are typically calculated from a combination of information regarding a behavior or activity generating the emission and an emission factor. (See section 8 for sample calculations and Section 9 for a summary of results.)

- In the case of the inventory for the Bishop Paiute Reservation, information collected from two surveys of tribal residents provided valuable information on topics like backyard trash burning and wood burning for home heating. Recent traffic surveys were used to calculate particulate emissions from dirt roads and other vehicular emissions. (See Section 6 on collecting primary data.)
- Emissions factors were obtained from reports from the state and local air pollution control districts. EPA provides a comprehensive list of factors, but may be more difficult to use and less suitable to local conditions. (See Section 7 on sources of emissions factors.)

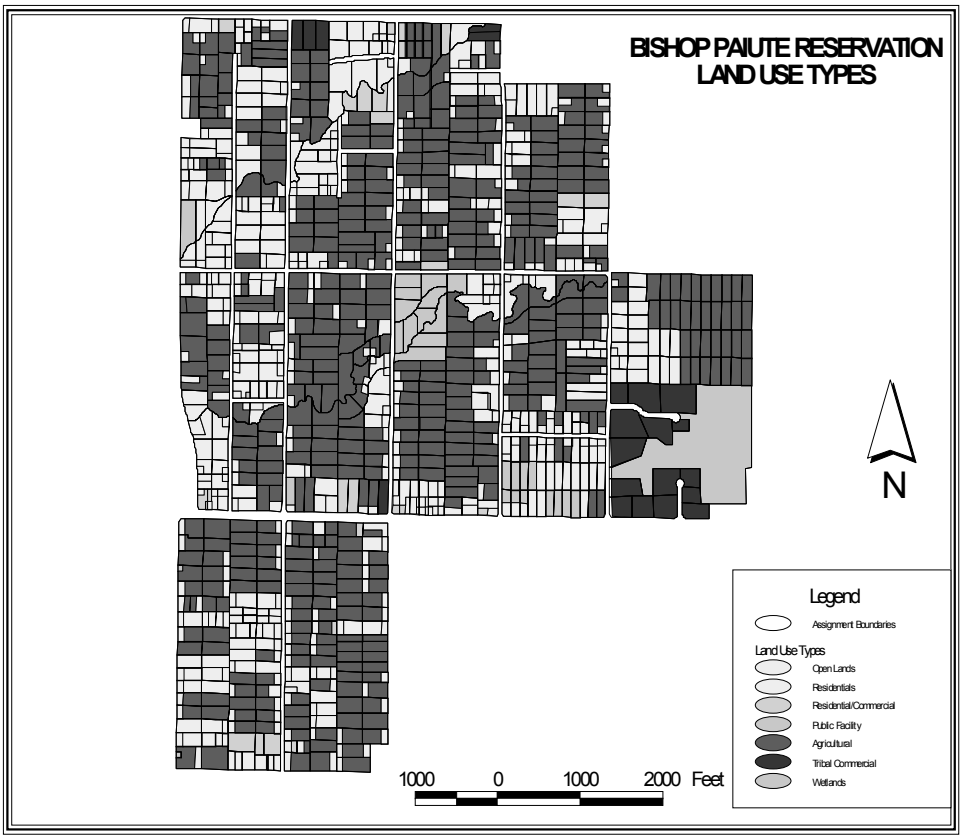
BODY

1. Maps

Maps showing the location of the tribe / reservation relative to the airshed (with terrain features), the local air pollution control district, and important sources provide important visualization of key features. Simple maps can be constructed without expensive and complicated geographic information systems, using widely available topographic software. Two examples are shown below. Map 1 shows the Bishop Paiute Reservation. Map 2 shows the airshed.

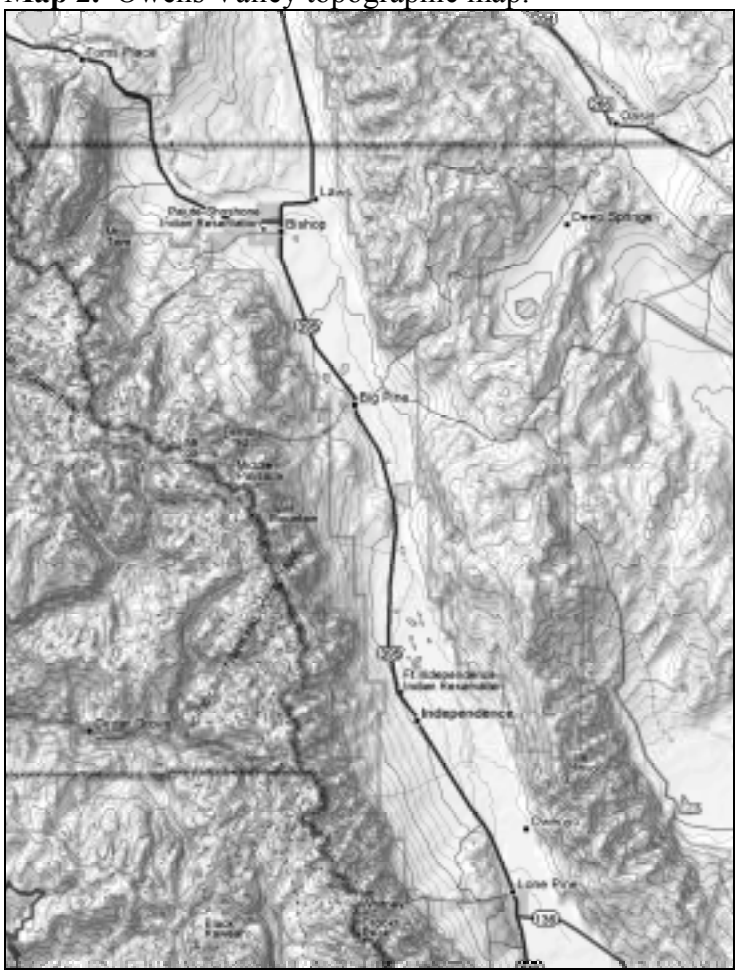
Map 1 was generated using the tribe's GIS system and is part of an integrated discussion of the background, location and history of the tribe. It shows that a significant portion of the reservation is agricultural. This can be important information for evaluating the types of sources located within the reservation boundaries. Simpler maps can be drawn using commercially available topographic mapping software.

Map 1. Bishop Paiute Reservation land use.



Map 2 is a regional map drawn using commercially available topographic software. Because the Owens Valley where the Bishop Paiute Tribe is located is a deep valley, with mountain ranges rising to 14,000 feet on either side, shaded relief maps are valuable to show these key terrain features that may trap pollutants. This type of map can also be used to show the location of the reservation relative to important sources.

Map 2. Owens Valley topographic map.



The local air pollution control district or state air quality agency is another useful source of maps. In California, the state is divided into districts. A map of the district, locating the reservation relative to that district is a useful tool as it shows how existing monitoring may shed light on tribal / reservation air quality. Such as map can also reveal important gaps in existing monitoring networks and help with planning. In addition, the local air pollution control district (in this case the Great Basin Unified Air Pollution Control District) was able to provide a map showing the projected area affected by dust from the largest source in the region (the Owens Dry Lake, largest source of PM-10 in the nation). This showed potential impact on the Bishop Paiute Tribe.

2. Weather Information

Weather information provides a general look into local conditions and is an important tool in forecasting the dispersion of pollutants. Weather information was obtained from the website www.weather.com [1] . This website contains National Weather Service data for most cities and towns that have a reporting weather station. In the case of Bishop, data are from the airport. Unfortunately, the site does not include wind information, but it does contain temperature and precipitation information that may be useful. The simple summary data that can be reported in tabular form, like Table 1 below.

Table 1. Meteorological data for Bishop airport weather station, 1948-2001.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Overall
Temperature													
Average High (deg. F)	53	58	63	71	80	90	97	94	86	76	62	53	**74**
Average Low (deg. F)	22	26	30	35	43	51	56	54	46	37	27	21	**39**
Mean (deg. F)	38	42	47	53	62	71	77	75	67	57	45	38	**58**
Record High (deg F.)	76	81	87	93	101	109	109	107	112	97	84	78	**112**
Year	1998	1986	1966	1989	1951	1954	1972	1993	1995	1980	1988	1958	
Record Low (deg. F)	-7	-2	9	15	25	29	34	37	26	16	5	-8	**-8**
Year	1974	1969	1971	1953	1964	1988	1987	1959	1948	1970	1958	1990	
Precipitation													
Average (Inches)	1.1	1.0	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.6	0.8	**5.4**

SOURCE: National Climatological Data Center as reported on www.weather.com, 7/15/2002.

An alternative source of weather data is the National Climatic Data Center. These data can be ordered on-line from their website www.ncdc.noaa.gov [2] . Because they may cover a long period, these data can be a useful adjunct to any meteorological data that the tribe may choose to collect.

3. Helpful Websites for Air Quality Data

A number of websites contain information contain information on air quality. Typically local air pollution control districts report both to US EPA and to their state agency (the Air Resources Board in California). US EPA and many state air quality agencies maintain websites. These contain summary information including exceedances and are typically based on geographical units like counties. They can provide useful summaries of the regional air quality picture. Tables 2 and 3 show some of the summary information for Inyo County where the Bishop Paiute Reservation is located.

US EPA Data

Table 2 below shows exceedances for Inyo County in 2001, selected from a table generated from the US EPA data base www.epa.gov/air/data [3] . Interpreting this information required a call to the local air pollution control district where a staff member identified the sources and monitoring stations associated with these high values. This information can also be gleaned directly from the EPA website by those who have sufficient determination.

Table 2. Inyo County summary data for exceedances of federal standards.

Year	Ozone (PPM) 2nd Max 24-hr	PM-10 (μg/m^3) 2nd Max 24-hr	PM-10 (μg/m^3) Annual Mean
2001	0.092	12,160	267.7

SOURCE: US EPA AIRData, Monitor Summary Report, 2001 www.epa.gov/air/data

State of California Data

More detailed information for Inyo County was also obtained from the California Air Resources Board website www.arb.ca.gov [4] , shown in Table 3 below. Inyo County is a rural county where only 2 percent of the land is privately owned. Table 3 reveals that the Owens Dry Lake, wildfires and motor vehicles are the most important source of pollutants. This information helped guide further investigative efforts.

Table 3. Inyo County 2001 estimated annual emissions in tons per day.

Category Name	TOG	ROG	CO	NOX	SOX	PM	PM-10
Fuel Combustion	0.01	0.01	0.03	0.69	0.56	0.08	0.06
Waste Disposal				0.00		0.00	0.00
Cleaning and Surface Coatings	0.24	0.20					
Petroleum Production and Marketing	0.06	0.06					
Industrial Processes			0.00	0.03	0.03	1.29	0.59
Subtotal Stationary Sources	**0.30**	**0.26**	**0.04**	**0.71**	**0.59**	**1.37**	**0.65**
Solvent Evaporation	1.41	1.38					
Miscellaneous Processes*	0.75	0.33	4.53	0.10	0.01	1,642.69	825.79
Subtotal Area-Wide Sources	**2.16**	**1.71**	**4.53**	**0.10**	**0.01**	**1,642.69**	**825.79**
On-Road Motor Vehicles	2.02	1.88	16.52	1.96	0.01	0.04	0.04
Other Mobile Sources	0.48	0.45	2.40	0.54	0.06	0.04	0.04
Subtotal Mobile Sources	**2.50**	**2.33**	**18.91**	**2.50**	**0.07**	**0.08**	**0.08**
Subtotal Natural Sources**	**0.12**	**0.07**	**1.90**	**0.09**		**0.39**	**0.37**
TOTAL	**5.08**	**4.37**	**25.38**	**3.40**	**0.67**	**1,644.63**	**826.90**

NOTES: * Primary source of area-wide air pollution is fugitive windblown dust (mainly from the Owens Dry Lake).
** Primary natural source of air pollution is wildfires.
DEFINITIONS: TOG: total organic gasses; ROG: reactive organic gasses; CO: carbon monoxide; NOX: nitrogen oxides; SOX: sulfur oxides; PM: particulate matter; PM-10: particulate matter less than 10 microns in diameter
SOURCE: California Air Resources Board website, www.arb.ca.gov 4/17/02.

The California Air Resources Board data was also used to construct comparisons with neighboring airsheds to evaluate whether the level of particular pollutants was high or low in the region relative to adjacent regions. The EPA data could be used similarly to obtain comparisons for neighboring counties if state data were not available.

IMPROVE Data

Many tribes are located near national parks that may have IMPROVE sites. Using this information can help broaden the regional picture of air quality. Downloading data is straightforward and simple data elements like PM-10 and PM-2.5 can be chosen from the large number of parameters offered. Their website is vista.cira.colostate.edu/improve [5] . The Bishop Tribe used information from Yosemite, Sequoia, and Death Valley National Parks.

Typically IMPROVE data are collected on a one-in-three-day schedule, so the number of observations is large and developing a strategy for data summaries is essential. The Bishop Tribe's Air Program used monthly and annual averages for PM-10 and PM-2.5 to look at seasonal patterns and trends. Sample graphs for the Sequoia National Park site are shown in Figures 1 and 2 below. Sequoia was chosen because transport from the San Joaquin Valley may be a concern. In addition, seasonal patterns may be valuable for comparison to other local data (from the local air pollution control district, for example) because many emissions (such as wood smoke) have a characteristic seasonal pattern.

Figure 1. Yearly average particulate matter, Sequoia National Park.

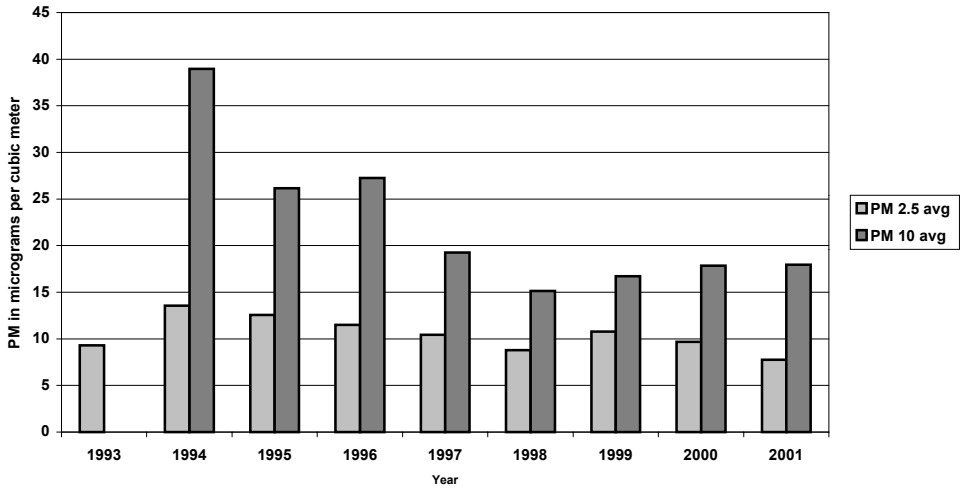
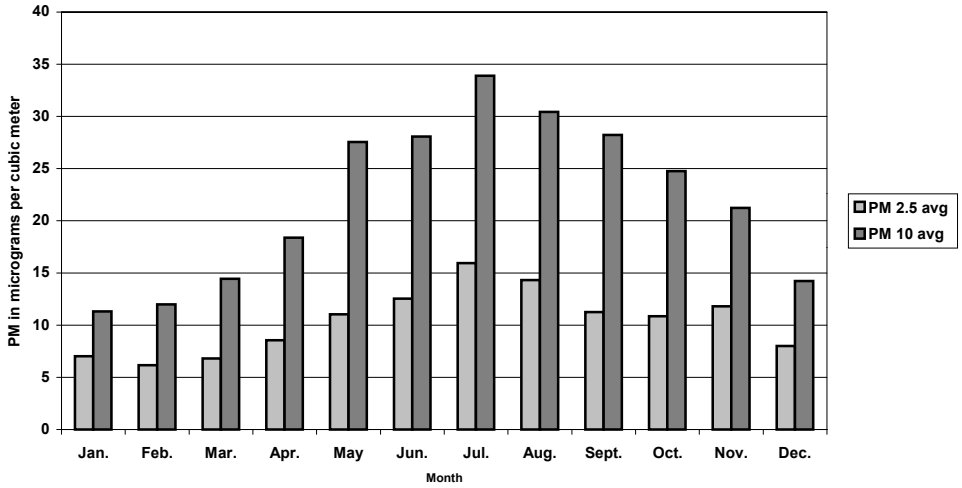


Figure 2. Monthly average particulate matter, Sequoia National Park.



SOURCE: IMPROVE website vista.cira.colostate.edu/improve, 1/2/03

4. Data from Local Air Pollution Control Districts

Local air pollution control districts can be an invaluable source of information. Their reports can be used as models for tribal reports, and their monitoring data from nearby stations can be analyzed before the tribe is able to initiate its own monitoring program to gain a good understanding of local air quality. The Bishop Tribe has the good fortune to work with the Great Basin Unified Air Pollution Control District. Their expertise and helpful assistance have enabled the Bishop Tribe's air program to advance at a rapid pace.

Reports

State and local air pollution control districts generate a vast number of reports. Some of these may contain emission inventories that can serve as a model for tribal efforts. The emission inventories may also contain emission factors that are specific to the local area and are more appropriate than those contained in the EPA database. The Bishop Tribe used emission information from two planning documents for neighboring communities, Mammoth Lakes 40 miles to the North [6] and the Owens Dry Lake, 60 miles to the South [7] . These served as key documents identifying important sources of air

pollution that the tribe needed to consider in its own emission inventory. These reports also contained emission factors for a number of key sources. The factors were specific to the region and were selected instead of more generic factors available from EPA.

At the time the Bishop Tribe's source and emission inventory was being compiled, the California Air Resources Board was conducting hearings regarding a proposed rule to ban backyard burn barrels. The Californian Air Resource Board report [8] and reports from the California Integrated Waste Management Board [9] were used in estimating emissions from backyard trash burning on the reservation.

Monitoring Data

The Great Basin Unified Air Pollution Control District also provided monitoring data from a nearby site, located in the adjacent town of Bishop. Although monitoring was discontinued in 1997, information on three criteria pollutants was available for a number of years. Analyses of these data provided valuable insights.

The criteria pollutants examined were particulate matter (PM-10), carbon monoxide (CO), and ozone. Particulate matter was collected on a one-in-six-day schedule from 1987 to 1997. Minima, maxima and frequency distributions were calculated to get a sense of the range of values present in this series. The frequency distribution is shown in Table 4 below. Generally, these data reveal good air quality, despite some exceedances of the California state standard.

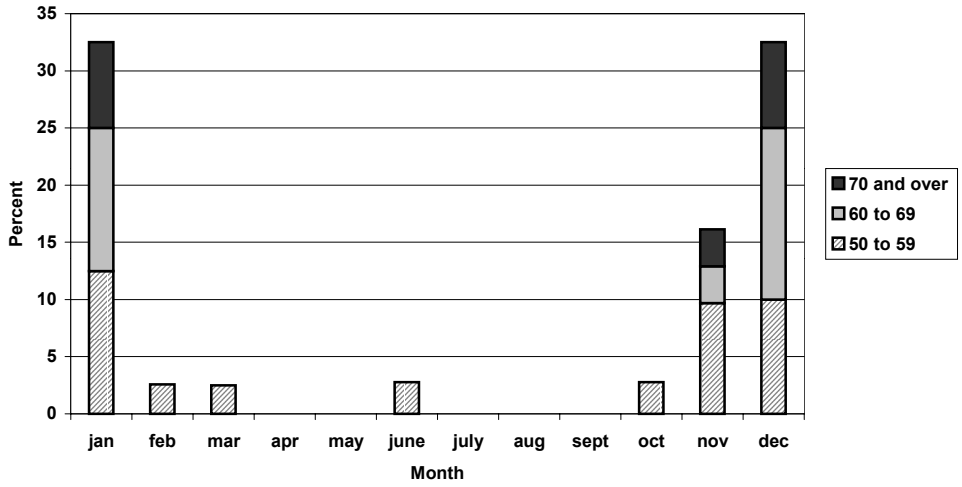
Table 4. Percent distribution of 24-hour PM-10 values, Bishop, California, 1987-1997.

PM-10	0 to 9	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70 and over
Percent	3%	40%	33%	12%	4%	4%	3%	2%

NOTE: Federal Standard is 150 μg / m^3 and state standard is 50 μg / m^3.
SOURCE: Great Basin Unified Air Pollution Control District, data archives.

Monthly summaries were examined in both tabular and graphical format to determine the seasonal pattern. Examination of seasonal patterns is valuable because it can provide important clues as to the likely sources for a given pollutant. These results are shown in Figure 3. In the case of the Bishop Paiute Reservation, high values in November through January point to wood stoves for home heating as a likely important source for future investigation. In addition, it was determined that any monitoring system should be able to accurately measure the volatile component of particulate matter.

Figure 3. Percent of measurement days over California standard for PM-10 (> 50 μg / m^3), Bishop, California, 1987-1997.



SOURCE: Great Basin Unified Air Pollution Control District, data archives.

Carbon monoxide and ozone data were collected on an hourly basis from 1991 to 1995, with no exceedances in Bishop during that period. The large number of observations (approximately 33,000) meant that monthly averages, minima and maxima could be estimated with considerable accuracy. These were plotted to show the seasonal pattern. The main finding from this exercise is that the levels for these pollutants are relatively low. These results are shown in Figures 4 and 5.

Figure 4. Ozone for Bishop, California.

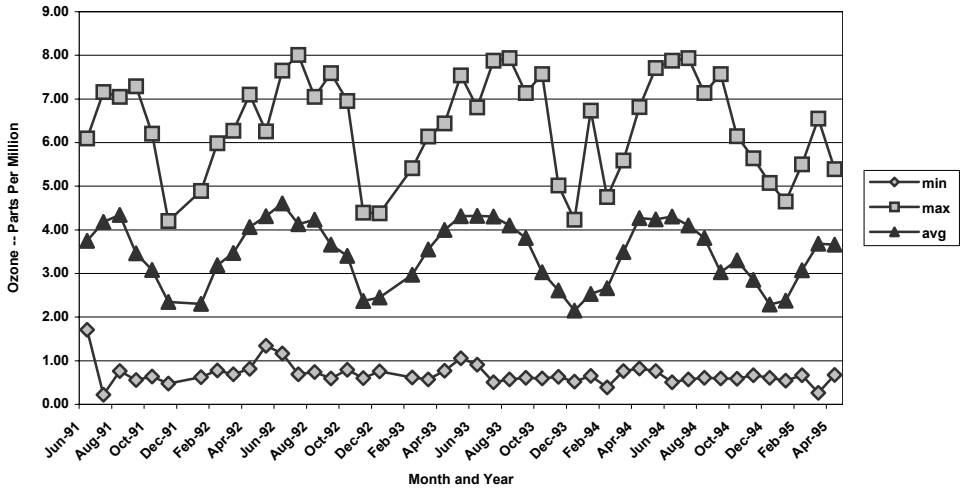
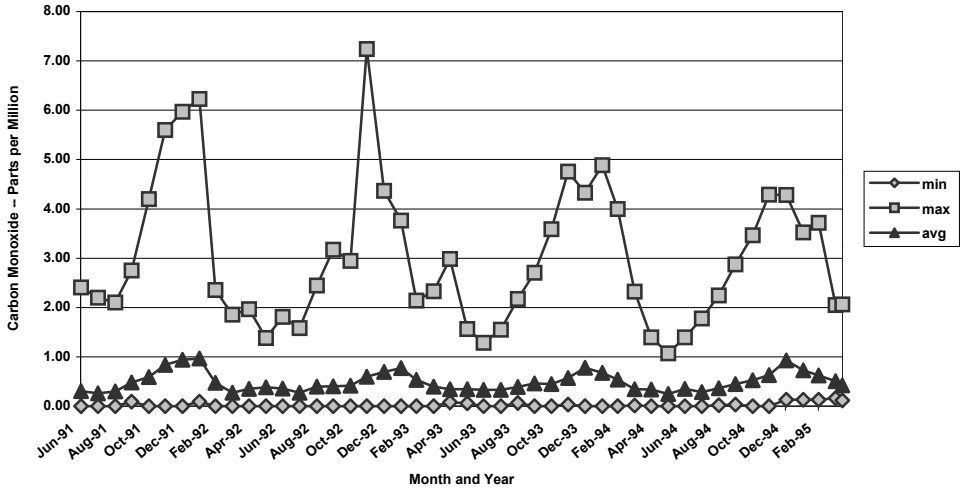


Figure 5. Carbon monoxide for Bishop, California.



SOURCE: Great Basin Unified Air Pollution Control District, data archives

Permit Information

Permit information from local air pollution control districts can help identify important off-reservation commercial and industrial sources. In the case of the Bishop area, there were relatively few permitted off-reservation sources, all minor, and none produced large amounts of pollutants.

5. Identifying On-reservation Sources

The analyses of data from federal, state and local databases most likely will reveal many of the most important sources to be considered because the sources affecting the tribe / reservation are likely to be the same as those affecting the region more generally. These analyses should be supplemented with a careful review of likely commercial and industrial operations, and as well as mobile and area sources on the reservation. Permitting information for the surrounding region may be helpful in identifying important commercial and industrial sources. For many reservations, dirt roads, backyard trash incineration and wood burning for residential heating may be important. Motor vehicles may be another important source. Identifying sources is likely to be primarily the result of careful observation and familiarity with activities on the reservation.

In completing this process, it is important to remember that emission inventories are evolving documents that need regular updating. These updates are an opportunity to add sources that may have been missed in a prior version, to add new sources as they develop, and to remove old sources that are no longer relevant.

6. Collecting Primary Data

Collecting primary data is generally necessary to evaluate on-reservation emissions. In the case of the Bishop Paiute Reservation, the primary concerns were backyard trash burning, residential wood burning for home heating, emissions from burning vegetative waste, emissions from dirt and paved roads.

Primary data collection was accomplished through two survey instruments. These provided key information on the behavior of reservation residents on wood burning for home heating and backyard trash burning. The tribe's Community Development Department (housing) was coincidentally conducting a chimney-sweeping project. Project participants were asked to complete a simple

questionnaire regarding their wood burning practices. At the same time, the tribe's Economic Development conducted a house-to-house personal interview with the majority of reservation residents. This survey instrument included a number of questions on backyard trash burning, including practices, whether residents were affected, and methods for addressing the problem. It also contained information on wood burning for home heating.

The surveys were supplemented with information from other sources. The total number of households was estimated from the number of residences with sewer and water hook-ups, obtained from the Bishop Indian Utility Organization. In the case of backyard trash burning, estimates of the amount of household trash produced were obtained from the California Integrated Waste Management Board study [9]. For vehicle emissions, miles traveled were estimated using recent traffic surveys that had been conducted by the Inyo County Department of Public Works as part of a study to investigate the location of stop signs and the tribe's own transportation plan [10]. Finally, the combined information from on-reservation vehicle miles traveled was combined with California Air Resources Board estimates of vehicle emissions for Inyo County were combined to compute the tribe's share of vehicle emissions.

7. Sources of Emission Factors

Emissions factors are typically obtained from the US EPA publication, known as AP-42. This information is available on-line at the US EPA website www.epa.gov/ttnchie1/ap42 [11] and can be ordered on CD or in hard copy. Navigating this encyclopedia of emission factors can be a rather daunting and arduous experience. In the case of the Bishop Paiute Reservation's emission inventory, emissions factors were culled from various specific state and local reports [6, 7, and 8]. These emission factors were often calculated using information that is more specific to the locale than those in AP-42, and the information was easy to find. In addition, most of the reports examined contained the necessary calculations, substantially simplifying the process. This approach may not always be viable for reservations with a more complex air quality environment. However, it is possible that this simplified approach may be employed to advantage for a number of sources if not all sources.

8. Sample Emission Calculations for Wood Smoke

Data Sources

Wood Burning Survey. During the course of chimney sweeping activities undertaken by the Community Development Department, participants were asked to complete a questionnaire on their use of wood for home heating and on the use of back yard incinerators for trash disposal. Out of approximately 100 households taking advantage of the chimney sweeping service, 23 returned completed questionnaires. These questionnaires were used to estimate the number of cords and the type of wood burned. On average 3.14 cords were burned by the household, with the majority reporting that they burned either various types pine (primarily Jeffrey and Pinon). Therefore soft woods are used to estimate emissions from stoves.

General Tribal Survey. As part of developing a Comprehensive Economic Development Strategy for the Bishop Paiute Tribe and updating the Economic Development plan, a general survey was administered to 366 households. Households were asked about their use of wood stoves for home heating. This survey is used to estimate the number and type of wood stoves on the reservation. Seventy-eight percent of households report heating their homes with wood. Of these, 32 percent report that their stove is an EPA-certified wood stove. The Bishop Indian Utility Organization reports that there are approximately 570 residential water and sewer hook-ups on the Reservation. This is a maximum estimate.

Calculations

The steps below summarize the sequence of calculations to estimate emissions from wood burning for residential heating.

Estimating the number of households according to heating practices.

Equation (1): Total number of households heating with wood
= 570 x .78 = 445

Equation (2): Total number of households heating with a standard wood stove
= 445 x .68 = 303

Equation (3): Total number of households heating with an epa-certified wood stove
= 445 x .32 = 142

Constants (from Town of Mammoth Lakes, Air Quality Management Plan, 1990) [6] .

Mass = # cords x 800 kg/cord

Emission factors (e.f.):

8.1 g/kg EPA-certified wood stoves

15.0 g/kg standard wood stoves

Calculation of PM-10 emission estimates.

Equation (4): PM-10 emissions / device
= Mass x e.f.

Calculating annual PM-10 emissions for standard wood stoves.

Equation (5): PM-10 emissions / standard wood stove
= 3.14 cords x 800 kg/cord x 15.0 g/kg
= 37,680 g
= 37.68 kg/stove

Equation (6): Annual PM-10 emissions for all standard wood stoves
= 37.68 x 303 = 11,417 kg/year

Calculating annual PM-10 emissions for EPA-certified wood stoves.

Equation (7): PM-10 emissions / EPA-certified wood stove
= 3.14 cords x 800 kg/cord x 8.1 g/kg
= 20,347 g
= 20.35 kg/stove

Equation (8): Annual PM-10 emissions from all EPA-certified wood stoves
= 20.35 x 142 = 2,889 kg/year

Calculating total PM-10 emissions for all stoves.

Equation (9): Total annual PM-10 emissions from all stoves
= 11,417 + 2,889 = 14,306 kg/year

This final number is an estimate of the amount of particulate that is generated by all wood stoves on the reservation.

9. Summary Emission Inventory Results

To make the emission inventory results comprehensible, and given the context of the airshed, where particulates were the most important pollutant, a summary table of PM-10 emissions for on-reservation sources was compiled. This table was useful to prioritize future monitoring and regulatory activities. It is shown in Table 5. In this case, particulate matter from residential wood burning for home heating

clearly stands out as the largest source on the reservation. Residential trash burning was also emphasized as a source that might be suitable to regulatory activity due to the emission of dioxins and the associated nuisance factor.

Table 5. PM-10 from on-reservation sources.

SOURCE	**PM-10** (Kg/year)	**PM-10** (tons/year)
Residential Trash Burning	1,562	1.72
Smoke from Residential Wood Burning for Home Heating	14,306	15.77
Vegetative Waste	127	0.14
Fugitive Dust from Dirt Roads	4,745	5.23
Entrained Paved Road Dust	3,584	3.95
Other Vehicle PM-10	322	0.35

CONCLUSIONS

Creating a useful source and emission inventory need not be a complicated or difficult task, if other resources are brought to bear. Many tribes have the opportunity to work with state and local air quality agencies and can obtain data and reports that can guide tribal efforts. This information is particularly valuable in describing the overall air quality picture for the region where the tribe / reservation. Regional information enhances any reservation-specific emission information be creating a context that helps interpret results and prioritize results for future planning. Familiarity with the regional picture can then guide the on-reservation data collection and analysis effort and simplify that process. The final document should be a convenient and usable report that can guide both air quality monitoring and development planning efforts for the tribe / reservation.

REFERENCES

[1] The Weather Channel: www.weather.com .

[2] National Climatic Data Center: www.ncdc.noaa.gov .

[3] US Environmental Protection Agency: www.epa.gov/air/data .

[4] California Air Resources Board: www.arb.ca.gov .

[5] IMPROVE: vista.cira.colostate.edu/improve .

[6] Ono, Duane, William Taylor and Debra Lawhon, *Air Quality Management Plan for the Town of Mammoth Lakes*, Great Basin Unified Air Pollution Control District, Bishop, CA 1990.

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KEYWORDS

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Source
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Tribe
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