EXECUTIVE SUMMARY

Pechan performed a quality control review of the 1996 WRAP point source inventory for the WRAP Emissions Forum. Overall findings are summarized below. More detailed results are provided in the attachments. This analysis was performed separately for utilities and non-utilities. Each of these sectors is addressed below, followed by combined observations about possible effects of observed problems in the base year emissions data base on visibility modeling.

Non-Utilities

Part of the non-utility analysis included comparing the 1996 WRAP non-utility point source file estimated SO_2 emissions (plant totals) with those in what is termed the 1996 WRAP true-up inventory (Pechan, 2000). The true-up inventory was developed to measure progress by the nine Commission Transport Region States in meeting SO_2 emission milestones. There are about 200 facilities in the true-up inventory. For cases where the non-utility plants matched, but had different emissions, the table below shows the differences in annual SO_2 emissions reported in the two inventories (*True-Up - Base Year*). If the true-up inventory is correct, Arizona's non-utility point source SO_2 emissions are 18,000 tons too high in the WRAP point source file. The other Transport Region States underestimate their SO_2 emissions by small amounts (43 to 2,078 tons).

State	SO_2 Emissions Difference (Tons)
Arizona	-18,020
California	359
Colorado	334
Idaho	942
Nevada	43
New Mexico	1,306
Oregon	2,078
Wyoming	114

There are some facilities in the true-up inventory that are not represented in the 1996 WRAP point source inventory. These facilities and their SO_2 emissions are listed in the table below.

State	County	Plant	Emissions (Tons)
Arizona	Navajo	Stone Container	2,455 SO_2
Idaho	Caribou	Nu West/Agrium	799 SO_2
Idaho	Madison	Ricks College	193 SO_2
Idaho	Minidoka	Magic Valley Foods	118 SO_2
Nevada	Lincoln	Graymont/Continental Lime	967 NO_X
New Mexico	Eddy	Transwestern Pipe/Duke Energy/Huber	231 SO_2
Oregon	Lane	Weyerhaeuser Particle	372 SO_2

Oregon	Lane	Globe Metallurgical	200 SO_2

California's non-utility inventory included 25 Source Classification Codes (SCCs) that were not in the Environmental Protection Agency's (EPA) SCC master list. The SCCs in question have 2,741 tons per year of associated SO_2 emissions, which is 7% of California non-utility annual SO_2 emissions.

North Dakota, a State not included in the True-Up Inventory, reported discrepancies between the annual emissions reported in the 1996 Base Year Inventory and the annual emissions on file in North Dakota for 1996 for 26 non-utility plants. The cumulative annual differences (*North Dakota - Base Year*) are -5,421 tons of SO_2 and +4,648 tons of NO_x.

The States with emissions points that had stack parameters with one or more values outside the range of expected values are listed below. The percentage of non-utility emission points and non-utility SO_2 emissions in the State that those emission points represent are indicated as well.

One-or-More Stack Parameters Outside Normal Range - Non-utilities		
State	**% State Non-Utility Emission Points**	**% State Non-Utility SO_2 Emissions**
Arizona	2.43	0.08
California	6.84	38.07
Colorado	20.54	0.22
Montana	2.75	0.15
New Mexico	1.49	9.99
North Dakota	0.51	0.00
Oregon	2.50	0.01
South Dakota	2.78	0.00
Utah	42.60	62.32
Washington	2.06	14.45
Wyoming	2.44	2.63

Utilities

The three issues most affecting the utility SO_2 emissions are discussed below followed by statistical summaries.

1. Stack Flow

Colorado reported all stack flows in the wrong units (cubic feet per minute) rather than in cubic feet per second; therefore, the stack flows should be 1/60th of what they are in the data base. This affects all of Colorado's 92,297 tons of utility SO_2 emissions.

2. Missing/Incorrect Stack Parameters

Utah reported the same numeric values for stack gas flow rate and exit velocity for almost all (97 percent) of its 28,580 tons of utility SO_2 emissions. The velocity values are incorrect.

Wyoming reported missing or incorrect stack parameters for almost all (99 percent) of its 86,128 tons of utility SO_2 emissions.

3. SCC Discrepancies

Arizona assigned about one-half (46 percent) of its 121,903 tons of utility SO_2 emissions to the wrong SCC codes.

Washington assigned almost all (99.9%) of its 78,286 tons of utility SO_2 emissions to the wrong SCC code. This will only affect the modeling if the speciation or temporal profiles are different for lignite and subbituminous coal-firing.

Part of the utility analysis involved comparing the utility portion of the 1996 WRAP point source file with SO_2 emission estimates by facility that were developed by Pechan for EPA for the 1996 National Emission Inventory using continuous emission monitoring information or data that the utilities submit each year to the Department of Energy. State-level SO_2 emission differences are listed in the table below. Negative numbers indicate that the WRAP point source file estimates are believed to be too high. Overall, the WRAP 1996 inventory is believed to underestimate utility SO_2 by 22,564 tons.

State Level Utility SO_2 Differences for the 12 Western States

State	SO_2 Emissions
Arizona	-1,626
California	-
Colorado	393
Idaho	-
Montana	-
Nevada	-
New Mexico	5,752
North Dakota	-
Oregon	-
South Dakota	-
Utah	3,444
Washington	99
Wyoming	14,507
TOTALS	**22,564**

Overall statistics by State for the western States with one or more stack parameters outside the normal range are shown in the table below.

One-or-More Stack Parameters Outside Normal Range - Utilities		
State	**% State Utility Emission Points**	**% State Utility SO_2 Emissions**
Arizona	7.6	7.1
California	2.3	54.6
Colorado	100.0	100.0
New Mexico	33.0	1.1
Utah	90.0	96.5
Wyoming	95.0	98.9

QC Issues Most Likely to Affect Modeling Results

The emissions preprocessor uses the stack gas exit velocity and the stack diameter to calculate plume rise. Only if the exit velocity is zero or not reported is the flow rate used in this calculation. So, incorrect flow rates are only a problem if no velocity is reported. Because most of the utility and non-utility units in Utah had flow rates entered for both flow rate and exit velocity, the plume rise will be overestimated for all of these units, and may be placed in an atmospheric layer that is higher than actual.

Arizona assigned about one-half of its 121,903 tons of utility SO_2 emissions and Washington assigned all of its utility SO_2 emissions to the wrong SCC code. These mis-assignments can effect assignments of speciation and temporal profiles. The Washington State mis-assignment (for Centralia) will only affect the modeling results if the speciation or temporal profiles are different for lignite and subbituminous coal.

Pechan estimates that utility SO_2 emissions in the WRAP 1996 point source inventory are underestimated by 22,500 tons per year. States that underestimated their utility SO_2 emissions by more than 5 percent of their State total were Wyoming, New Mexico, and Utah (in order).

Conversely, Pechan estimates that non-utility SO_2 emissions in the WRAP 1996 point source inventory are overestimated by 12,800 tons. Arizona's 18,000 ton overestimate is counter balanced somewhat by slight underestimates in the other Transport Region States.

Quality Assurance Review of the Non-Utility Sources
Western Regional Air Partnership 1996 Base Year Inventory

Methodology

The quality assurance (QA) analysis of the non-utility sector of the Western Regional Air Partnership (WRAP) 1996 Base Year Inventory ("Base Year Inventory") began with the 211,689 records in the inventory that were not assigned an ORIS plant code during the utility portion's QA. ORIS plant codes are devised by the Dept. Of Energy (DOE), Energy Information Administration (EIA) and are reported by industry on DOE EIA forms; they uniquely identify utility sources; sources without an ORIS plant code are considered "non-utility." The following five analyses were performed on the data to identify and resolve data integrity issues that may affect modeling accuracy:

- Comparison to the 1996 SO_2 True-Up Point Source Inventory
- Validation of Source Classification Codes
- Quality Assurance of Stack Parameters
- Quality Assurance of Coordinates
- Quality Assurance of Particulate Matter Emissions

The following sections describe each QA process analysis, the data discrepancies identified, and data supplied by State agencies to resolve data discrepancies. Unresolved data discrepancies are also discussed.

Comparison to the 1996 SO_2 True-Up Point Source Inventory

By comparing two emissions inventories, discrepancies in an inventory can be found that may affect modeling. The 1996 SO_2 True-Up Point Source Inventory ("True-Up Inventory") was developed by the WRAP for those plants that had 100 tons per year or more of SO_2 (sulfur dioxide) emissions (for further information, reference the WRAP document "Historic and Future SO_2 Emissions Analysis Nine State Western Region," E.H. Pechan & Associates, Inc., July 2000). The True-Up Inventory contains information at the plant level. To compare the Base Year Inventory to the True-Up Inventory, segment level emissions in the Base Year Inventory were summarized by State FIPS code, County FIPS code, and the plant ID. The plants in each inventory were then matched (or attempted to be matched) using State FIPS code, County FIPS code, plant ID, plant name, and SO_2 Emissions. The analysis was performed for all sources in the 1996 SO_2 True-Up Inventory, including copper smelters and sources that emit both over and under 100 tons of SO_2 per year.

Following from the results of the matching attempts, several discrepancies were identified. There are plants in the Base Year Inventory that have a significant disagreement with the annual SO_2 emissions reported in the True-Up Inventory. An annual SO_2 emissions discrepancy of 10%

or more is considered significant. Other plants have differences in plant ID, plant name, or County FIPS code. Additionally, for some of the True-Up Inventory plants, there is no clear match to a Base Year Inventory plant. There are also plants with over 100 tons per year of SO_2 present in the Base Year Inventory that are not in the True-Up Inventory. If any of these circumstances was present for a particular plant, it was reported to the appropriate State for a response. Both the True-Up Inventory and Base Year Inventory plant information was provided to assist in the comparison. The State was asked to identify or supply correct values. In the event that records needed to be added, the State was asked to provide the entire emission point information for the plant.

Validation of Source Classification Codes

Source Classification Codes (SCC) provide information on the process and the fuel that produces the associated emissions. The SCCs utilized in the Base Year Inventory were compared with the Environmental Protection Agency's (EPA) SCC master list (dated September 30, 2000). Plants were identified with SCCs that are not in the master list and with total annual emissions greater than 0. The State FIPS, County FIPS, plant ID, plant name, SCC, and summaries of the annual emissions were reported to the appropriate State. The State was asked to change the SCC to an SCC in EPA's master list or to provide the description for the SCC so that it can be added to EPA's master list.

Quality Assurance of Stack Parameters

Stack parameters identify both the physical aspects of an emissions stack and the dynamics of the exit gases that leave the stack. The 1996 Base Year Inventory includes values for stack height, diameter, temperature, velocity, and flow rate. The following are the ranges used to identify suspect stack parameters in EPA's National Emissions Inventory:

Height (ft): 0.01 to 1000
Diameter (ft): 0.01 to 50
Temperature (F): 50 to 1800
Velocity (ft/sec): 0.01 to 560
Flow rate (cu ft/sec): 0.01 to 1,100,000

The stack parameter values reported in the 1996 Base Year Inventory were compared to these ranges to identify suspect stack parameters. Additionally the velocity and flow rate were checked to ensure that they were at least 10 units apart. For records where one or more of the stack parameters was outside the range of expected values indicated above, the emission point information along with the stack parameters was provided to the States. The States were then asked to provide corrected parameters or verify that suspect parameters are correct.

Quality Assurance of Coordinates

Coordinates identify the geographic location of the plant. Plants having emission points with coordinates that did not fall within 5 kilometers of its county border were identified. The emission point information was then provided to the appropriate State. The State was asked to provide corrected coordinates or verify that the existing coordinates are correct.

Quality Assurance of Particulate Matter Emissions

Particulate matter (PM) emissions are not related to a specific chemical compound. PM emissions are instead identified by the size of the particle. Both PM10 and PM2.5 emissions were reported in the Base Year Inventory. PM10 represents particles 10 microns in diameter or smaller; PM2.5 represents particles 2.5 microns or smaller. In the Base Year Inventory, any emission point that had PM10 annual emissions greater than 0, but no PM2.5 annual emissions, was identified. The related SCCs were then analyzed to ensure that PM2.5 emissions were expected for the SCCs. For all of the emissions points having the issue, it was verified that the SCCs were expected to have PM2.5 emissions. The emission point information, SCC, and PM emissions were provided to the appropriate State. The States were asked to provide PM2.5 emissions.

Responses and Recommendations

As a result of the QA process, a number of issues were cited for sources within the States included in WRAP's 1996 Base Year Inventory. A report of those issues and a request for corrections were sent to the following States: Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington, Wyoming. Many of the issues that were presented to these States can now be resolved. In the following sections, the major issues that were found for the non-utility sources in each of the States are summarized. Recommendations for correction of the issues are also described.

In addition to the recommendations cited below, we recommend corrective action for stack parameters for the entire inventory. Values that are above the maximum value for the specified parameter should be adjusted back to the maximum value for that parameter. This will eliminate many discrepancies for which the respondents did not have time to analyze and provide corrections. We do not recommend this for the parameters outside of the lower range, as there were valid reasons given by the respondents for those issues.

Arizona

Major issues with the Arizona data in the 1996 Base Year Inventory are as follows:

- A Stone Container plant (County FIPS = 017, Plant ID = 0007), with annual emissions of 2,455 tons of SO_2 reported in the True-Up Inventory, is not present in the Base Year Inventory.
- Three plants with total annual SO_2 emissions greater than 100 tons per year are listed in the Base Year Inventory, but were not in the True-Up Inventory:

County FIPS	Plant ID	Plant	Base Year SO_2
013	1075	91st Ave Wastewater	120
019	0310	Arizona Portland Cement	4,058
019	0425	Tucson Electric	105

The total emissions are 4,283 tons of SO_2.

- One Magma copper smelter plant (BHP, Magma Metals, San Manual, Plant ID = 0032) in Pinal County (County FIPS = 021) is reported in the True-Up Inventory with annual emissions of 16,678 tons of SO_2. Four Magma copper plants are reported in the Base Year Inventory in Pinal County. Although 3 of the plants have no annual SO_2 emissions reported, one plant, Magma Copper Co. (Plant ID = 0102) has annual emissions of 27, 946 tons of SO_2. Thus, the Base Year Inventory has 11,268 tons of SO_2 not in the True-Up Inventory.
- A Cyprus Sierrita plant (County FIPS = 019, Plant ID = 0040) has annual emissions of 1,890 tons of SO_2 reported in the Base Year Inventory; the value reported in the True-Up Inventory is 548 tons of SO_2. Thus, the Base Year Inventory has 1,342 tons of SO_2 not in the True-Up Inventory.
- An American Smelting and Refining Company smelter (County FIPS = 007, Plant ID = 0615) has all of its SO_2 emissions reported under a single generic SCC, 30399999 (Industrial Process/Primary Metal Production/Other Not Classified), that provides no information about the processes at this plant. The smelter has annual emission of 33,124 tons of SO_2 and 71 tons of NO_X.
- The Cyprus Miami Company Miami Smelter (County FIPS = 007, Plant ID = 0040) reports all of its emissions to SCC 10300602 (Commercial/Institution External Combustion Boiler, Natural Gas) as if it is a boiler. If there is a boiler, it should have an industrial boiler SCC, not a commercial/institutional SCC. Also, the fuel is indicated as being natural gas, which has negligible SO_2 emissions. The smelter has annual emission of 5,737 tons of SO_2 and 305 tons of NO_X.

Other minor issues include four plants that have different plant IDs in the two inventories. Also, the analysis of the stack parameters resulted in identification of stack parameters that are outside of the range of acceptable values. Many of the stacks have a 0 value for the diameter, temperature, velocity, and flow rate. There are three plants in Arizona with emission release points 5 kilometers outside of the county border based on the coordinates.

Arizona was not able to respond with any corrections by the time of the writing of this report. As a result, the missing plants, SO_2 disagreements, and plant ID disagreements are listed in Table 1.

In lieu of any corrections from Arizona, our recommendations are as follows:

- Update the latitude and longitude at the emission segment level to reflect those in Table 2, which are the county centroid's coordinates.

California

Major issues with the California data in the 1996 Base Year Inventory are as follows:

- An Ultramar plant (County FIPS = 037, Plant ID = 191026800026) has annual emissions of 566 tons of SO_2 reported in the Base Year Inventory; the value reported in the True-Up Inventory is 959 tons of SO_2. The True-Up value was confirmed as being correct. Thus, SO_2 emissions from the plant are under reported by 393 tons in the Base Year Inventory.
- A Mobil Oil plant (County FIPS = 037, Plant ID = 191026800089) has annual emissions of 704 tons of SO_2 reported in the Base Year Inventory; the value reported in the True-Up Inventory is 807 tons of SO_2. The True-Up value was confirmed as being correct. Thus, 103 tons of SO_2 are missing from the Base Year Inventory.
- A Rhone-Poulenc plant (County FIPS = 037, Plant ID = 191026800131) has annual emissions of 201 tons of SO_2 reported in the Base Year Inventory. The actual value should be 443 tons of SO_2. Thus, 242 tons of SO_2 are missing from the Base Year Inventory.
- 25 distinct point source SCCs that are not in EPA's master list are used; 21 of the SCCs have emissions associated with them. These SCCs account for annual emissions of 2,741 tons of SO_2 and 333 tons of NO_X.

Other minor issues include plants with plant ID discrepancies in the two inventories. There are also over 150 emissions records where PM10 emissions are reported (greater than 0) and no PM2.5 emissions are reported. Finally, there are stack parameters used that are outside of the range of valid values. The majority of questionable stack parameters is due to a stack velocity of 650 (apparently a default value).

Andy Alexis of the California Air Resources Board (ARB) provided information that cleared up some of the California data issues. All of the plant ID discrepancies are justified because Mr. Alexis pointed out that the True-Up Inventory plant IDs were pre-1991 IDs, and the Base Year Inventory contains the updated IDs. Further data was provided to resolve the SO_2 discrepancies. Mr. Alexis also provided some descriptions of SCCs not in EPA's master list that are contained in his data base. The list of emission points that have these SCCs, with emissions greater than 0, is presented on Table 3; Mr. Alexis's descriptions are provided in Table 4. Mr. Alexis commented that the ARB has agreed not to change the SCCs submitted by the districts, even when they are not in the master list of SCCs.

Following from Mr. Alexis's data, our recommendations are as follows:

- Update the annual SO_2 emissions information (SO_2_ANN) for the plants listed in Table 5. Although emission segment level information was not provided, the emissions should be allocated to the segment level based on the current allocation of facility to segment emissions. The Ozone Season Day (OSD) emissions value should be calculated by using the equation:
  *OSD = (summer seasonal throughput / 100) * annual emissions / 92 days.*

Summer seasonal throughput identifies the amount of emissions that occur during the summer. When there is no summer seasonal throughput reported, the OSD value should be calculated by dividing the annual emissions by 365 days.

- Update the SO_2 emissions information for the segment level records in the Base Year Inventory to reflect those provided in Table 6. The annual emission value was provided by Mr. Alexis; the OSD value was calculated by using the equation:
  *OSD = (summer seasonal throughput / 100) * annual emissions / 92 days*.
  When there was no summer seasonal throughput reported, the OSD value was calculated by dividing the annual emissions by 365 days.
- The PM2.5 data for California should be left as is. The PM10 information was entered into EPA's PM Calculator. The resulting segment level PM2.5 emissions were negligible (less than 0.001 tons per year).
- The SCCs that are not in EPA's master list should not be replaced, as ARB cannot remove them from the California inventories. Although some descriptions were provided for the SCCs, the descriptions do not meet the level of detail in EPA's master list. California is considering the preparation of a crosswalk of known SCCs to be substituted for the SCCs not in the master list for future inventories; however, that information is not yet available. The result is that 2,741 tons of SO_2 and 333 tons of NO_X will remain allocated to the SCCs.

Colorado

Major issues with the Colorado data in the 1996 Base Year Inventory are as follows:

- A Holman Portland plant (County FIPS = 043, Plant ID = 0001) has annual emissions of 3,281 tons of SO_2 reported in the Base Year Inventory; the value reported in the True-Up Inventory is 3,615 tons of SO_2. The True-Up value was confirmed as being correct. Thus, 334 tons of SO_2 are missing from the Base Year Inventory.

Other minor issues include three plants that are 5 kilometers outside of the county border based on the latitude and longitude. There are also a number of stacks with stack parameters reported that fall outside of the range of expected parameters. Only 10 records did not have PM2.5 emissions reported where they were expected, and the PM10 emissions for those records are insignificant (less than 0.001 tons per year).

Roy Doyle of the Colorado Air Pollution Control Division provided information to resolve the Colorado data issues. Mr. Doyle provided information to correct the annual SO_2 emissions disagreement issues in the Base Year Inventory. For other plants, Mr. Doyle indicated that the Base Year Inventory's values were correct. He was also able to provide insight into the stack parameter issues. Originally, it was believed that the stack parameter issues may be a result of reporting in different units of time. However, Mr. Doyle confirmed that the velocity and flow rate were in units per second for the non-utility sources, and he provided some corrected parameters.

Given Mr. Doyle's data, our recommendations are as follows:

- Update the SO_2 emissions information for the segment level records in the Base Year Inventory as shown in Table 6. The annual emission value was provided by Mr. Doyle. The OSD emission value was calculated by using the equation:
  *OSD = (summer seasonal throughput / 100) * annual emissions / 92 days.*
  When there was no summer seasonal throughput reported, the OSD emission value was calculated by dividing the annual emissions by 365 days.
- Add the segment level records provided in Table 7 to the Base Year Inventory. Although they do not contain complete information, they help correct the SO_2 emissions issue. The data was provided by Mr. Doyle.
- Update the latitude and longitude for the segment level record in the Base Year Inventory with the corresponding provided in Table 2, which have been adjusted to be the county centroid coordinates.
- Update the stack velocity and stack flow information for the segment level record in the Base Year Inventory with the corresponding values provided in Table 9.
- The PM2.5 data for Colorado should be left as is. The PM10 information was entered into EPA's PM Calculator. The resulting segment level PM2.5 emissions were negligible (less than 0.001 tons per year).

Idaho

Major issues with the Idaho data in the 1996 Base Year Inventory are as follows:

- Three plants, Nu West/Agrium (County FIPS = 029, Plant ID = 0003), Ricks College (County FIPS = 065, Plant ID = 0011), and Magic Valley Foods (County FIPS = 067, Plant ID unknown), with combined annual emissions of 1,104 tons of SO_2 reported in the True-Up Inventory, are not present in the Base Year Inventory.
- Eight other plants have discrepancies in the total annual SO_2 emissions reported in the True-Up and Base Year Inventories as follows:

County FIPS	Plant ID	Plant	Base Year SO_2	True-Up SO_2	Discrepancy
005	0004	Ash Grove	482	200	+282
023	0001	DOE-INEL	736	1,847	-1,111
027	0010	Almagated Sugar	1,008	1,660	-652
067	0001	Almagated Sugar	535	306	+229
069	0001	Potlatch	1,476	700	+776
077	0005	FMC	2,976	4,994	-2,018
077	0006	Simplot	7,180	2,637	+4,543
083	0001	Almagated Sugar	366	1,364	-998

For all plants except FMC, the True-Up value was confirmed as being correct. There was no confirmation of either value for FMC.

- A Mountain Home plant (County FIPS = 039, Plant ID = 0001) has annual emissions of 196 tons of SO_2 reported in the Base Year Inventory. The actual value

should be 5.7 tons of SO_2, as indicated by Gary Reinbold, Air Quality Analyst with the Idaho Department of Environment Quality. Thus, an additional 190 tons of SO_2 are reported in the Base Year Inventory.

Mr. Reinbold was able to provide the necessary data to resolve most of these issues. The outstanding issues are that the NuWest/Agrum and Maggie Valley Foods plants are still missing from the inventory and an unresolved discrepancy in the SO_2 emissions reported for FMC. These issues are noted in Table 1.

Given Mr. Reinbold's provided data, our recommendations are as follows:

- Update the SO_2 annual emissions information (SO_2_ANN) for the plants listed in Table 5. Although segment level information was not provided, the emissions should be allocated to the segment level based on the current allocation of facility to segment emissions. The OSD SO_2 emissions should be recalculated based on the equation:
  *OSD = (summer seasonal throughput / 100) * annual emissions / 92 days.*
  When there is no summer seasonal throughput reported, the OSD emission value should be calculated by dividing the annual emissions by 365 days.
- Update the SO_2 emissions information (SO_2_ANN and SO_2_OSD) for the segment level records in the Base Year Inventory to reflect those provided in Table 6. The annual SO_2 emissions were provided by Mr. Reinbold. The OSD emission value was calculated by using the equation:
  *OSD = (summer seasonal throughput / 100) * annual emissions / 92 days.*
  When there was no summer seasonal throughput reported, the OSD emission value was calculated by dividing the annual emissions by 365 days.
- Add the segment level records provided in Table 7 to the Base Year Inventory. Although they do not contain complete information, they help correct the SO_2 emissions issue.

Montana

Montana has minor issues in the Base Year Inventory. There are a number of stack parameters that are outside the range of expected values. There are also a few emission points for which PM10 emissions were reported but PM2.5 emissions were missing.

Warren Norton of the Montana Department of Environment Quality was able to provide information to resolve all of Montana's data integrity issues.

Given Mr. Norton's provided data, our recommendations are as follows:

- Update the stack parameter values for the segment level record in the Base Year Inventory with the corresponding values provided in Table 9 where the records match at the segment level.
- Update the PM2.5 annual (PM2.5_ANN) and PM2.5 OSD (PM2.5_OSD) values for the segment level records in the Base Year Inventory with the corresponding values provided

in Table 8 where the records match at the segment level. The updated information was provided by Mr. Norton.

Nevada

Major issues with the Nevada data in the 1996 Base Year Inventory are as follows:

- A Graymont/Continental Lime plant, Pilot Peak (County FIPS = 017, Plant ID = 0007), with annual emissions of 967 tons of NO_X and 122 tons of PM10, identified by Tony Panchyshyn of Graymont is missing from the Base Year Inventory.
- A Basic Inc. plant (County FIPS = 021, Plant ID = 0500) has annual emissions of 272 tons of SO_2 reported in the Base Year Inventory; the value reported in the True-Up Inventory is 3 tons of SO_2. Thus, an additional 269 tons of SO_2 are reported in the Base Year Inventory. Additionally, the County FIPS reported in the True-Up Inventory is 023. The True-Up Inventory values for both the emissions and the County FIPS code were confirmed as being correct.
- Three other plants have significant discrepancies in the total annual SO_2 emissions reported in the True-Up and Base Year Inventories as follows:

County FIPS	Plant ID	Plant	Base Year SO_2	True-Up SO_2	Discrepancy
007	9004	Independence	158	0	+158
019	0387	Nevada Cement	381	340	+41
021	0002	US Army Hawthorne	119	6	+113

For all plants, the True-Up value was confirmed as being correct. Thus, an additional 312 tons of SO_2 are reported in the Base Year Inventory.

Lori Campbell, Environmental Scientist with the Nevada Bureau of Air Quality Planning, provided information to resolve some of these issues. The issues that are still outstanding include the missing information for the Pilot Peak plant and a small discrepancy in reported SO_2 emissions for a Titanium Metals plant. Ms. Campbell acknowledged the presence of the Pilot Peak plant. Nevada was unable to provide segment level information for the plant by the time of the writing of this report. The Titanium Metals plant is under the jurisdiction of Clark County. Carrie MacDougall of the Clark County Department of Air Quality was contacted, but Ms. MacDougall was not able to provide a response by the time of the writing of this report. The Titanium Metals plant's SO_2 emissions are under 100 tons per year, so this is not a significant issue. However, both of these outstanding issues have been listed in Table 1.

Given Ms. Campbell's provided data, our recommendations are as follows:

- Change the County FIPS and plant name for Basic, Inc. (State FIPS = 32, County FIPS = 021, Plant ID = 0500) to County FIPS = 023 and plant name = "Premier Chemicals," as indicated by Ms. Campbell. Additional updates to this plant's information are based upon this update being completed first.

- Change the plant name for U.S. Naval Undersea Warfare Center (State FIPS = 32, County FIPS = 021, Plant ID = 0002) to "US Department of Army, Hawthorne Army Depot," as indicated by Ms. Campbell.
- Update the SO_2 emissions information (SO_2_ANN and SO_2_OSD) for the segment level records in the Base Year Inventory to reflect those provided in Table 6. The annual SO_2 emissions were provided by Ms. Campbell. The OSD emission value was calculated by using the equation:
  *OSD = (summer seasonal throughput / 100) * annual emissions / 92 days.*
  When there was no summer seasonal throughput reported, the OSD emission value was calculated by dividing the annual emissions by 365 days.

New Mexico

Major issues with the New Mexico data in the 1996 Base Year Inventory are as follows:

- One significant SO_2 source, Transwestern Pipe/Duke Energy/Huber Gas (County FIPS = 015, Plant ID unknown), with annual emissions of 231tons of SO_2 reported in the True-Up Inventory, is not present in the Base Year Inventory.
- Three other plants have significant discrepancies in the total annual SO_2 emissions reported in the True-Up and Base Year Inventories as follows:

County FIPS	Plant ID	Plant	Base Year SO_2	True-Up SO_2	Discrepancy
015	0010	Artesia Refinery	2,252	1,552	+700
015	0126	Dagger Draw	426	0	+426
025	0046	GPM Gas/Lee Gas	180	0	+180

Thus, an additional 1,306 tons of SO_2 are reported in the Base Year Inventory than in the True-Up Inventory.

Other minor issues include 11 sites with emission points that are 5 kilometers outside of the county border based on the coordinates. New Mexico also has 80 emissions records where PM10 emissions are reported (greater than 0) and no PM2.5 emissions are reported. There are also a number of stack parameters that are outside the range of expected values. Additionally, previous to this QA analysis, Mr. Shively indicated a number of issues related to NO_X emissions, PM10 emissions, and PM control devices.

Mr. Shively was contacted to help resolve the issues. Upon reviewing the list of QA issues, Mr. Shively expressed the belief that the data for New Mexico was 1995 data, as mentioned previously. Additional New Mexico records without known QA issues were sent to him to review; Mr. Shively verified that those records also appeared to contain 1995 data. However, Mr. Shively also noticed data issues with the data that is contained in New Mexico's electronic data base. He concluded that the data in the 1996 Base Year Inventory may be the most representative for the year 1996. Mr. Shively recommended to just utilize the data that is in the Base Year Inventory.

Given Mr. Shively's recommendation, our recommendation is as follows:

- Update the latitude and longitude at the segment level to reflect those in Table 2, which are the county centroid's coordinates.
- Update the PM2.5 annual (PM2.5_ANN) and PM2.5 OSD (PM2.5_OSD) values for the segment level records in the Base Year Inventory with the corresponding values provided in Table 8, which were calculated with EPA's PM Calculator. Since there was no summer seasonal throughput reported, the OSD emission value was calculated by dividing the annual emissions by 365 days. Only records where the resulting PM2.5_ANN emissions produced by the calculator were greater than 0 are included..

North Dakota

Major issues with the North Dakota data in the 1996 Base Year Inventory are as follows:

- Total annual emissions for 26 plants do not match the totals that North Dakota has on file. The plants and corrected totals can be viewed in Table 5. The cumulative difference is 5,420 tons more of SO_2 and 4,648 tons less of NO_X reported in the Base Year Inventory than should be reported.

North Dakota originally was believed to only have minor stack parameter issues. Chuck McDonald of the North Dakota Division of Air Quality was contacted, and those issues were resolved. However, Mr. McDonald noticed from the plant totals that were provided to him that there were disagreements with the total emissions that he had on file, as indicated above. Emission totals for all of the North Dakota plants were then provided to him. Mr. McDonald was unable to provide segment level corrections for the emissions issues. However, he was able to provide updated emissions totals.

Given Mr. McDonald's provided data, our recommendations are as follows:

- Update all of the annual emissions information (SO_2_ANN, VOC_ANN, NO_X_ANN, CO_ANN, PM10_ANN, PM2.5_ANN, NH3_ANN) for the 26 plants listed in Table 5. Although segment level information was not provided, the emissions should be allocated to the segment level based on the current allocation of facility to segment emissions. The OSD emission value should be calculated by using the equation:
  *OSD = (summer seasonal throughput / 100) * annual emissions / 92 days.*
  When there is no summer seasonal throughput reported, the OSD emission value should be calculated by dividing the annual emissions by 365 days.

Oregon

Major issues with the Oregon data in the 1996 Base Year Inventory are as follows:

- Two plants, Weyerhaeuser Particle (County FIPS = 039, Plant ID unknown) and Globe Metallurgical (County FIPS = 039, Plant ID = 2125), with combined annual emissions of 572 tons of SO_2 reported in the True-Up Inventory, are not present in the Base Year Inventory.

- Two plants, Almagated Sugar Company (County FIPS = 045, Plant ID = 0002) and Pacific Gas Transmission Company (County FIPS = 049, Plant ID = 0026) have total SO_2 emissions reported that do not match the totals that Oregon has on file for 1996. Almagated Sugar should have annual emissions of 625 tons of SO_2, but the total reported in the Base Year Inventory is 1,038 tons of SO_2. Pacific Gas Transmission Company should have annual emissions of only 1.6 tons of SO_2, but the total reported in the Base Year Inventory is 2,802 tons of SO_2. The combined result is an additional 3,427 tons of SO_2 reported in the Base Year Inventory.
- Eight other plants have significant discrepancies in the total annual SO_2 emissions reported in the True-Up and Base Year Inventories as follows:

County FIPS	Plant ID	Plant	Base Year SO_2	True-Up SO_2	Discrepancy
051	2028	Gatx Terminals	135	3	+132
065	0001	Northwest Aluminum	568	448	+120
071	6142	Smurfit Newsprint	699	368	+331
071	5034	Cascade Steel Rolling Mills	175	29	+146
007	0004	James River II	760	573	+187
009	1849	Boise Cascade	774	685	+89
009	2520	Portland General Electric	439	0	+439
011	0015	Weyerhaeuser	969	126	+843

For all plants, the True-Up value was confirmed as being correct. Thus, an additional 2,287 tons of SO_2 are reported in the Base Year Inventory

Other minor issues included plant ID and smaller SO_2 discrepancies in the True-Up and Base Year Inventories. Also, two plants have emission points 5 kilometers outside of the county border based on the latitude and longitude. There are over 60 stacks with temperatures reported outside the expected range of values. Finally, there are a few emission records with PM10 emissions reported but missing PM2.5 emissions.

Jeffrey Stocum of the Oregon Department of Environmental Quality, Air Quality Division, was able to provide information to help resolve many of these issues. The plants missing from the Base Year Inventory is still an issue. Mr. Stocum stated that the plants are located in Lane County and permitted by the local Air Quality agency (LRAPA) and he did not have access to the data. All of the missing plants are listed in Table 1.

Incorporating Mr. Stocum's provided data, our recommendations are as follows:

- Update the annual SO_2 emissions information (SO_2_ANN) for the plants listed in Table 5. Although segment level information was not provided, the emissions should be allocated to the segment level based on the current allocation of facility to segment emissions. The OSD emission value should be calculated by using the equation:
  *OSD = (summer seasonal throughput / 100) * annual emissions / 92 days.*

When there is no summer seasonal throughput reported, the OSD emission value should be calculated by dividing the annual emissions by 365 days.

- Update the SO_2 emissions information (SO_2_ANN and SO_2_OSD) for the segment level records in the Base Year Inventory to reflect those provided in Table 6. The annual SO_2 emissions were provided by Mr. Stocum. The OSD emission value was calculated by using the equation:
  *OSD = (summer seasonal throughput / 100) * annual emissions / 92 days*.
  When there was no summer seasonal throughput reported, the OSD emission value was calculated by dividing the annual emissions by 365 days.
- Update the Point ID, Segment, SCC, and SO_2 emissions information (SO_2_ANN and SO_2_OSD) for the segment level records in the Base Year Inventory to reflect those provided in Table 6. The annual SO_2 emissions, updated Point IDs, updated Segments, and updated SCCs were provided by Mr. Stocum. The OSD emission value was calculated by using the equation:
  *OSD = (summer seasonal throughput / 100) * annual emissions / 92 days*.
  When there was no summer seasonal throughput reported, the OSD emission value was calculated by dividing the annual emissions by 365 days.
- Add the segment level records provided by Mr. Stocum, in Table 7, to the Base Year Inventory. Although they do not contain complete information, they help correct the SO_2 emissions issue.
- Delete the complete segment level records that match those provided in Table 10. Mr. Stocum indicated that many of those processes were shut down and should be removed. This is needed to correct the SO_2 emissions issues.
- Update the stack parameter values for the segment level record in the Base Year Inventory with the corresponding values provided in Table 9 where the records match at the segment level.
- Update the latitude and longitude at the segment level to reflect those in Table 2, which are the county centroid's coordinates.
- Update the PM2.5 annual (PM2.5_ANN) and PM2.5 OSD (PM2.5_OSD) values for the segment level records in the Base Year Inventory with the corresponding values provided in Table 8, which were calculated with EPA's PM Calculator. The OSD emission value was calculated by using the equation:
  *OSD = (summer seasonal throughput / 100) * annual emissions / 92 days*.
  When there was no summer seasonal throughput reported, the OSD emission value was calculated by dividing the annual emissions by 365 days. Only records where the resulting PM2.5_ANN emissions produced by the calculator were greater than 0 are included.

South Dakota

South Dakota has one minor issue with a source, Wharf Resources, that has stack parameters outside of the expected range. The parameters are set to 0.

Chris Hanson, Natural Resources Engineer for the South Dakota Department of Environment and Natural Resources, was contacted to resolve this issue. For Wharf Resources, Mr. Hanson indicated that the stack parameters given are for crushing operations at a mine, explaining the 0 values.

As a result, no action needs to be taken on the South Dakota data.

Utah

Major issues with the Utah data in the 1996 Base Year Inventory are as follows:

- Plant names are incorrect for the majority of Utah plants in the Base Year Inventory. This was a known issue before the QA process and is still the most prevalent issue.
- 343 Point IDs in the non-utility portion of the Base Year Inventory have no correlation to the data that originated from Scott Hanks of the Utah Department of Environmental Quality, Division of Air Quality. All of the suspect Point IDs begin with "0" or "1-1." The total annual emissions related to the points are 332 tons of SO_2 and 6,684 tons of NO_X. There may be a legitimate reason for the addition of these points, but Mr. Hanks could not identify the points in his files.
- A large number of stacks have parameters outside the expected range of values. 62% of the State's non-utility SO_2 emissions are associated with a stack parameter outside of the range of expected values. 25% of the non-utility stacks have a stack velocity of 0, accounting for 7% of the non-utility SO_2 emissions. The remainder of questionable parameters have high stack velocities that are equal to the flow rate.

Other minor issues include emission points 5 kilometers outside of the county border based on the coordinates, and there are missing PM2.5 emissions.

Mr. Hanks reviewed the list of issues with Utah. Mr. Hanks recommends replacing the plant names and stack parameters by matching to the data in the data base that he provided. He also recommends replacing the plant IDs for the Utah data to with the site IDs that he provided, since Utah will be using those site IDs going forward. The Access data base that Mr. Hanks provided has been named "Utah_WrapFix" (originally named "WrapFix") for easier identification.

Given Mr. Hanks provided data, our recommendations are as follows:

- Update the plant names in the 1996 Base Year Inventory with a combination of the "O Name" and "Site Name" provided in the "1996_AFS_KeyTable" table that Mr. Hanks provided in his WrapFix data base.
- To match more closely with Utah data in 1999 and on, update the plant ID with the information in the 1996_AFS_KeyTable. The current plant ID used in the 1996 Base Year Inventory is in the "AFS/NEDS Plant ID" column; the "Site ID" column contains the plant ID that Utah will be using from 1999 on.
- Update the stack parameters for segment level records using the values of the "Stack Height," "Stack Diameter,", "Stack Temperature," and "Exit Gas Flow Rate" provided by

Mr. Hanks in the "tblPoint-EmissionReleasePoint" table in the WrapFix data base. Stack velocity values are missing, but can be calculated from the other parameters via the equation:
*flow rate = velocity * π * (diameter/2)*^{2}.
Following these corrections, to further ensure valid ranges of values, stack parameters that are above the maximum value for the specified parameter should be adjusted back to the maximum value for that parameter, as recommended for all stack parameters. Coordinates should not be updated from this information, as they are in different units.

- Update the latitude and longitude at the segment level to reflect those in Table 2, which are the county centroid's coordinates.
- Update the PM2.5 annual (PM2.5_ANN) and PM2.5 OSD (PM2.5_OSD) values for the segment level records in the Base Year Inventory with the corresponding values provided in Table 8, which were calculated with EPA's PM Calculator. The OSD emission value was calculated by using the equation:
*OSD = (summer seasonal throughput / 100) * annual emissions / 92 days*.
When there was no summer seasonal throughput reported, the OSD emission value was calculated by dividing the annual emissions by 365 days. Only records where the resulting PM2.5_ANN emissions produced by the calculator were greater than 0 are included.

Washington

Major issues with the Washington data in the 1996 Base Year Inventory are as follows:

- A Graymont/Continental Lime plant, (County FIPS = 053, Plant ID = 0005), with annual emissions of 139 tons of NO_X and 125 tons of PM10 should not be in the Base Year Inventory. Tony Panchyshyn of Graymont stated in an e-mail that Graymont only has one source in Washington, even though two are reported in the Base Year Inventory. Sally Otterson of the Washington State Department of Ecology, Air Quality Program, identified this plant as the source that should be removed.
- The other Graymont/Continental Lime plant, (County FIPS = 053, Plant ID = 820) currently is reported as annually emitting 277 tons of NO_X and 248 tons of PM10. Since this plant belongs in the Base Year Inventory, these emissions should actually be 139 tons of NO_X and 125 tons of PM10 (the values of the plant to remove) as indicated by Tony Panchvshyn of Graymont. Thus, an additional 138 tons of NO_X and 123 tons of PM10 are reported in the Base Year Inventory.

Other minor issues include 64 emission points 5 kilometers outside of the border of the county based on the latitude and longitude; all of these emission points are associated with one source, US Navy Shipyard at Puget Sound. Washington also has a number of points with stack parameters reported that are outside the range of expected values. There are emission records with PM10 emissions reported but missing PM2.5 emissions.

Ms. Otterson was contacted for assistance in resolving the issues. As indicated earlier, Ms. Otterson identified which Graymont plant should be eliminated from the Base Year Inventory. Additionally, she provided corrected coordinates. For the stack parameter issues, Ms. Otterson stated the following: "An emission point can consist of several or many stacks/vents, and when this is the case the height and diameter are usually given for the average stack; but the flow rate is the total for all the stacks. Because exit velocities are simply calculated from the flow rate and stack diameter, unrealistic velocities may appear in the data set." Ms. Otterson does not have access to PM2.5 data in 1996.

Given Ms. Otterson's provided data, our recommendations are as follows:

- Remove all records related to the Continental Lime plant listed in Table 10.
- Update the annual NO_X and PM10 emissions information (NO_X_ANN and PM10_ANN) for the plant listed in Table 5. Although segment level information was not provided, the emissions should be allocated to the segment level based on the current allocation of facility to segment emissions. The OSD emission value should be calculated by using the equation:
  *OSD = (summer seasonal throughput / 100) * annual emissions / 92 days.*
  When there is no summer seasonal throughput reported, the OSD emission value should be calculated by dividing the annual emissions by 365 days. This is to be done to correct the emissions for the remaining Graymont plant to the emission indicated by Tony Panchyshyn for the plant.
- Update the latitude and longitude at the segment level to reflect those in Table 2, which are the values provided by Ms. Otterson.
- Update the stack parameter values for the one corrected segment level record in the Base Year Inventory with the corresponding values provided in Table 9 where the records match at the segment level. This information was provided by Ms. Otterson.
- Update the PM2.5 annual (PM2.5_ANN) and PM2.5 OSD (PM2.5_OSD) values for the segment level records in the Base Year Inventory with the corresponding values provided in Table 8, which were calculated with EPA's PM Calculator. The OSD emission value was calculated by using the equation:
  *OSD = (summer seasonal throughput / 100) * annual emissions / 92 days.*
  When there was no summer seasonal throughput reported, the OSD emission value was calculated by dividing the annual emissions by 365 days. Only records where the resulting PM2.5_ANN emissions produced by the calculator were greater than 0 are included.

Wyoming

Major issues with the Wyoming data in the 1996 Base Year Inventory are as follows:

- A Little America Refinery plant (County FIPS = 025, Plant ID = 00005) has annual emissions of 1,515 tons of SO_2 reported in the Base Year Inventory. The actual value should be 1,470 tons of SO_2. Thus, an additional 45 tons of SO_2 are reported in the Base Year Inventory.

- 47 emission release points do not have a stack velocity value. The total annual emissions related to these points are 1,113 tons of SO_2 and 335 tons of NO_X.

Other minor issues include two plants having emission points 5 kilometers outside of the border of the county based on the latitude and longitude. There are also a small number of emission records with PM10 emissions reported but missing PM2.5 emissions. There were other disagreements between the True-Up and Base Year Inventory, but in each case the Base Year Inventory was confirmed as being correct.

Lee Gribovicz of the Wyoming Department of Environment Quality, Air Quality Division, was contacted to help resolve the issues. Mr. Gribovicz was able to provide information to resolve the issues. The majority of the stack parameter problems were a result of the stack representing a tank farm or flare, and some corrected parameters were supplied for other instances.

Given Mr. Gribovicz's provided data, our recommendations are as follows:

- Update the latitude and longitude at the segment level to reflect those in Table 2, which are the latitude and longitude values derived from the section/township/range values provided by Mr. Gribovicz. The Porcupine Booster stack at point ID 004 was indicated as a stack that is not listed in the values provided by Mr. Gribovicz. The stack only has VOC emissions (7.74 tons annually) associated with it and can be eliminated without significantly affecting emissions. Otherwise, its coordinates should be corrected to the values specified in Table 2.
- Update SO_2 emissions information (SO_2_ANN and SO_2_OSD) for the segment level records in the Base Year Inventory to reflect those provided in Table 6. The annual SO_2 emissions were provided by Mr. Gribovicz. The OSD emissions are 0 because the annual emissions are 0.
- Update the stack parameter values for the segment level records in the Base Year Inventory with the corresponding values provided in Table 9 where the records match at the segment level. There are three distinct sets of data for Wyoming. The first set contains complete corrected parameters as provided by Mr. Gribovicz. The second set contains stack velocities and flow rates that we recommend setting to 0, as they represent tank farms or other sources not easily quantified with parameters. The third and final set of parameters, which includes the flares, contain stack velocity values calculated from the other parameters via the equation:
  $flow\ rate = velocity * \pi * (diameter/2)^2$.
  This was necessary because those parameters were missing velocity. When required, the units of velocity and flow rate were converted to units per second from units per minute. In some instances, flow rate was provided in cubic feet per minute at standard conditions instead of actual conditions.
- Update the PM2.5 annual (PM2.5_ANN) and PM2.5 OSD (PM2.5_OSD) values for the segment level records in the Base Year Inventory with the corresponding values provided in Table 8, which were calculated with EPA's PM Calculator. The OSD emission value was calculated by using the equation:

*OSD = (summer seasonal throughput / 100) * annual emissions / 92 days*.
When there was no summer seasonal throughput reported, the OSD emission value was calculated by dividing the annual emissions by 365 days. Only records where the resulting PM2.5_ANN emissions produced by the calculator were greater than 0 are included.

Quality Assurance Review of the Utility Sources
Western Regional Air Partnership 1996 Base Year Inventory

Methodology

For Task 1 of Amendment No. 1 of the Western Governors' Association (WGA) Contract No. 30203-37, Pechan prepared a quality assurance/quality control (QA/QC) review of the 1996 "utility" portion of the point source data file developed by PES. The following text explicates the procedures followed as well as the results of the review, which are displayed in the included workbooks with a separate spreadsheet for each State.

Procedure

General

1. Pechan started with the 214,471-record WGA 1996 point source file and matched to accepted Energy Information Administration (EIA) unique plant codes called ORIS plant codes (ORISPLs) to all possible utility plants at the plant level; this first stage "utility" file had 2,782 source classification code (SCC)-level records [Note: SCCs are assigned as a classification system to differentiate among processes.].

2. Plants with ORISPLs but with no SCCs that had or could be changed to have an SCC that began with 101 (External Combustion Boilers, Electric Generation) or 201 (Internal Combustion Engines, Electric Generation) were eliminated, as were all other records with an SCC that began with 102 (External Combustion Boilers, Industrial) or 202 (Internal Combustion Engines, Industrial) (unless it was determined that the SCC should be changed to one that began with 101 or 201). This second stage "utility" file had 1,453 SCC-level records. Note that one additional record – at Wyoming's PACIFICORP-NAUGHTON POWER PLANT, with SCC=30100999 (Industrial Processes, Chemical Manufacturing, Other) – was kept in (without a boiler ID, an accepted EIA code used to uniquely identify each boiler at a given plant) because it had significant SO_2 emissions. Note: (1) Records with SCCs beginning with 201 were not assigned a boiler ID since they could not be matched back into the updated 1996 National Emission Inventory (NEI) utility portion (which only includes steam fossil-fuel boilers) to check on data values. (2) Some boilers have multiple records for the same fuel type because all the emissions are not on the same plant-boiler-SCC record. The spreadsheet for each State with flags indicating whether the record is included in the first or second stage "utility' file is included in the workbook, **StateWGA96utfiles.xls**

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3. The entire first stage utility file's latitudes and longitudes coordinates were mapped and it was determined that all coordinate pairs were within 5 km of their reported county.

4. The emissions (from the second stage utility file) for all those records with a boiler ID (given or assigned by Pechan) were totaled within each of the 21 States. These emissions were compared with the totaled emissions for the same boilers in the updated 1996 NEI. The totals and percent difference for each State is included in the spreadsheet, **StateutEMtots96.xls**. A total of 6 States have significant differences of at least ten percent for at least one pollutant; these 6 States (Arizona, Colorado, New Mexico, Utah, Washington, and Wyoming) are the only States reported by PES to have submitted point source data to replace the updated 1996 NEI data. Of the 21 States:

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5. QA/QC checks were performed on specific data elements by State. Concerns are delineated in spreadsheets, along with summary remarks, comments, and recommendations, when possible.

6. The SCC records for "major" sources within the six States that the PES report stated submitted data different from the updated 1996 NEI's (Arizona, Colorado, New Mexico, Utah, Washington, and Wyoming) were first reviewed. A "major source" is defined as a plant whose 1996 SO_2 emissions is at least 100 tons.

Major Sources Six State Review

7. The latitude and longitude for each record was checked against those in a Pechan-developed file; those that differed by more than 0.5 degrees were mapped to see whether they could be acceptable.

8. The five stack parameters were checked to determine whether (a) they each were within acceptable ranges determined by the U.S. Environmental Protection Agency's (EPA) Emission Factor and Inventory Group (EFIG) (height: 0 to 1,250 ft., temperature: 32 to 2,250 degrees F, diameter: 0.25 to 50.0 ft, and velocity: 0 to 650 ft/sec) and (b) the measures for stack diameter, velocity, and flow were mathematically consistent, per the algorithm:

Stack Flow (ft^3/sec)=π * (Stack Diameter (ft)/2)^2 * Stack Velocity (ft/sec)

9. The boilers' WGA SO_2 control efficiencies were compared with those in the updated 1996 NEI.

10. The WGA's plant emissions for SO_2, NO_x, PM_{10}, $PM_{2.5}$, CO, and VOC (in tons) were compared with that in the updated 1996 NEI. The plant emissions totals are expected to be different for the six States and the same for all the other States.

11. The review of the above checks for the major sources in the six States that submitted non-NEI utility data is included in the workbook, **Stateut6QAQC.xls**, with a separate spreadsheet for each of the six States.

Major Sources Other States Review

Further review was completed for the other State's major sources, whose data presumably is the same as that in the updated 1996 NEI since the PES report does not indicate that other data were submitted. Checks for #7 - #11 were completed and it was determined that the data were the same, as expected, in the two files – except for the cases outlined in the workbook, **StateutotherQAQC.xls**. Only 7 States are included in the workbook.

Results

The following section describes the utility discrepancies, and the responses received by Pechan, for 13 of the States.

Arizona

Issues with Arizona's data are as follows:

- Cholla plant has 12,159 tons of SO_2 from boilers 1, 2, 3, and 4 assigned to the SCC code for industrial coal boilers when the emissions are actually from four utility coal boilers.
- For Apache Station, the SO_2 emissions of 8,632 tons of SO_2 from boilers 2 and 3 are assigned to the SCC code for diesel internal combustion engines when the emissions are actually from two utility coal boilers.
- For Coronado, the SO_2 emissions of 14,263 tons of SO_2 from boilers U1B and U2B are assigned to the SCC code for industrial coal boilers when the emissions are actually from two utility coal boilers.
- For Springerville, the SO_2 emissions of 20,705 tons of SO_2 from boilers 1 and 2 are assigned to the SCC code for industrial distillate oil boilers when the emissions are actually from two utility coal boilers.

- Cholla plant has 1,484 tons of SO_2 from boilers 1 and 2 with an SO_2 control efficiency of 0% for both boilers when the SO_2 control efficiency for these two boilers is actually 80.0% and 90.0%, respectively.
- Coronado's boilers U1B and U2B have an SO_2 control efficiency of 0% for both boilers when the SO_2 control efficiency is actually 85.2% for both boilers.
- Springerville's boilers 1 and 2 have an SO_2 control efficiency of 0% for these two boilers when the SO_2 control efficiency is actually 68.0% for both boilers.
- Apache Station's boilers 2 and 3 have a stack diameter, velocity, and flow which are mathematically inconsistent and need to be recalculated.

Overall, Arizona utility SO_2 emission totals for 1996 are overestimated by 1,626 tons of SO_2 or 1.4% when compared with EPA estimates.

Arizona did not respond with any corrections by the time of the writing of this report.

California

California agreed that the Moss Landing plant had inaccurate coordinates; they provided corrected latitude and longitude values of 36.803 and 121.730 degrees, respectively.

Colorado

Issues with Colorado's data are as follows:

- At the Cherokee plant, the 6,666 tons of SO_2 from boiler 4 incorrectly has an SO_2 control efficiency of 0% for this boiler; they provided an SO_2 control efficiency of 21.9%; they additionally provided an SO_2 control efficiency of 17.0% for boiler 1 at this same plant.
- At the Craig plant 9,069 tons of SO_2 from boilers C1, C2, and C3 incorrectly have an SO_2 control efficiency of 0%; they provided SO_2 control efficiencies of 65.0%, 65.0%, and 80.0%, respectively, for these three boilers.
- At Rawhide 844 tons of SO_2 from boiler 101 incorrectly has an SO_2 control efficiency of 0%; they provided an SO_2 control efficiency of 82.7% for this boiler.
- Colorado agreed that stack flow was in cubic feet per minute for all utility boilers and needed to be converted to cubic feet per second for all utility boilers.
- Four plants have stack parameter problems:
  - At the Cameo plant, 1,888 tons of SO_2 from boiler 2 have a stack diameter, velocity, and flow which are mathematically inconsistent and need to be recalculated.
  - At the Cherokee plant, 13,368 tons of SO_2 from boilers 1, 2, and 4 have a stack diameter, velocity, and flow which are mathematically inconsistent and need to be recalculated.

  - At the Comanche plant, the 14,463 tons of SO_2 from boilers 1 and 2 have a stack diameter, velocity, and flow which are mathematically inconsistent and need to be recalculated.
  - At the Rawhide plant, the stack diameter, velocity, and flow are mathematically inconsistent and need to be recalculated.
- At the Pawnee plant, boiler 1 is associated with a single stack, not the two stacks provided; however, they did not state which of the two stacks was correct.
- At the Ray D Nixon plant, 6,488 tons of SO_2 from boiler 1 are associated with a single stack, not the two stacks provided; however, they did not state which of the two stacks was correct.

Overall, Colorado utility SO_2 emission totals for 1996 are underestimated by 393 tons of SO_2 or 0.4% when compared with EPA estimates.

Colorado partially responded regarding utility discrepancies.

Iowa

Issues with Iowa's data are as follows:

- The Riverside plant has inaccurate NO_X emissions of 320 tons of NO_X when compared with EPA's value of 178 for boiler 1, and inaccurate NO_X emissions of 522 tons of NO_X when compared with EPA's value of 292 for boiler 2.

Iowa did not respond with any corrections by the time of the writing of this report.

Minnesota

Issues with Minnesota's data are as follows:

- Three Minnesota plants have NO_X emissions that differ from values estimated by Pechan for the NEI:
  - The Hibbing plant has inaccurate NO_X emissions of 378 tons of NO_X when compared with EPA's value of 184 for boiler 1, inaccurate NO_X emissions of 118 tons of NO_X when compared with EPA's value of 64 for boiler 2, and inaccurate NO_X emissions of 288 tons of NO_X when compared with EPA's value of 157 for boiler 3.
  - The Virginia plant has inaccurate NO_X emissions of 81 tons of NO_X when compared with EPA's value of 50 for boiler 8, and inaccurate NO_X emissions of 661 tons of NO_X when compared with EPA's value of 361 for boiler 9.
  - The Willmar plant has inaccurate NO_X emissions of 454 tons of NO_X when compared with EPA's value of 249 for boiler 3.

Minnesota did not respond with any corrections by the time of the writing of this report.

Nevada

Nevada provided, unasked, actual (different from the data base) coal emissions for the units in their one utility plant, Reid Gardner. Reid Gardner's SO_2 emissions are 3,168 tons lower when compared with EPA estimates – 6,716 tons of SO_2 originally versus 3,547 using Nevada's updated numbers. Additionally, Reid Gardner's NO_X emissions are 15,114 tons lower when compared with EPA estimates – 29,403 tons of NO_X originally versus 14,288 using Nevada's updated numbers.

New Mexico

Issues with New Mexico's data are as follows:

- The Raton plant has 170 tons of SO_2 from boilers 4 and 5 that are assigned to the SCC code for utility spreader stoker coal boilers when the emissions are actually from two utility pulverized coal wet bottom coal boilers.
- The Escalante plant has 754 tons of SO_2 from boiler 1 with an SO_2 control efficiency of 0% when the SO_2 control efficiency for this boiler is actually 93.33%.
- At San Juan, SO_2 emissions of 34,971 tons of SO_2 from boilers 1, 2, 3, and 4 have an SO_2 control efficiency of 0% for all four boilers when the SO_2 control efficiencies are actually 65.0%, 74.0%, 65.0%, and 65.0%, respectively, for the four boilers.
- Escalante's boiler 1 has a stack diameter, velocity, and flow which are mathematically inconsistent and need to be recalculated.
- Escalante's boiler 1 is associated with two stacks when it should be associated with one – which one is unknown.

Overall, New Mexico utility SO_2 emission totals for 1996 are underestimated by 5,752 tons of SO_2 or 7.3% when compared with EPA estimates.

New Mexico informed us that the New Mexico State data in the data base may be for the data year 1995, not 1996, and that they may wish to replace all the 1995 data with 1996 data. However, New Mexico later recommended that we use the data in the inventory, as it may be the most accurate representation of 1996.

Oregon

Oregon's response contained no changes to their utility data.

South Dakota

South Dakota provided NO_X emissions (different from the data base) for one plant, Ben French. SO_2 emissions are 341 tons lower when compared with EPA estimates – 1,285 tons of SO_2 originally versus 944 tons of SO_2 using South Dakota's updated numbers.

Texas

Issues with Texas' data are as follows:

- Texas has three plants with inaccurate coordinates:
  - The Laredo plant has an inaccurate longitude coordinate of 98.800 degrees when compared with EPA's value of 99.509 degrees.
  - The P H Robinson plant has an inaccurate longitude coordinate of 94.371 degrees when compared with EPA's value of 94.980 degrees.
  - The Trinidad plant has an inaccurate longitude coordinate of 95.421 degrees when compared with EPA's value of 96.102 degrees.

Texas did not respond with any corrections by the time of the writing of this report.

Utah

Issues with Utah's data are as follows:

- Utah has three plants with incorrect SO_2 control efficiencies:
  - At the Hunter plant, SO_2 emissions of 6,278 tons of SO_2 from boilers 1, 2, and 3 have an SO_2 control efficiency of 0%, for all three boilers, respectively when the SO_2 control efficiencies are actually 82.1%, 81.9%, and 92.2% for the three boilers.
  - At the Intermountain plant, SO_2 emissions of 3,759 tons of SO_2 from boilers 1SGA and 2SGA have an SO_2 control efficiency of 0% for both boilers when the SO_2 control efficiencies are actually 92.4% and 92.2%, respectively, for the two boilers.
  - At the Huntington plant, SO_2 emissions of 2,139 tons of SO_2 from boiler 1 has an SO_2 control efficiency of 0% when the SO_2 control efficiency is actually 83.0%.
- Many of Utah's plants have the same numeric value for both stack velocity and stack flow; this is not possible and we recommend that these stack parameters be checked. These plants are:
  - Carbon (4,917 tons of SO_2 from boilers 1 and 2).
  - Hunter (boilers 1, 2, and 3), Intermountain (boilers 1SGA and 2SGA).
  - Huntington (boiler 1).

Utah responded that they "do not collect or calculate exit velocity;" stack velocity will need to be calculated using stack flow.

- The correct plant name for the Hunter plant is "Hunter," not "Cabinet Manufacturing."
- The correct plant name for the Carbon plant is "Carbon," not "Nucor Steel."

Overall, Utah utility SO_2 emission totals for 1996 are underestimated by 3,444 tons of SO_2 or 10.8% when compared with EPA estimates.

Utah partially responded regarding utility discrepancies.

Washington

Issues with Washington's data are as follows:

- At the Centralia plant, 78,173 tons of SO_2 from boilers BW21 and BW22 are assigned to the SCC code for utility lignite wall-fired coal boilers, when the emissions are actually from two utility subbituminous tangential coal boilers.
- Steam Plant No 2 plant has the 113 tons of SO_2 from boilers 1 and 2 associated with two stacks for boiler 1 and three stacks for boiler 2 when they should be associated with one – which one is unknown.

Washington's suggested that we contact John Anderson of the Puget Sound Clean Air Agency regarding this stack information.

Washington reported that the large discrepancy in PM_{10} and $PM_{2.5}$ emissions at the State level was correct, as these emissions were reported by the source.

Overall, Washington utility SO_2 emission totals for 1996 are underestimated by 99 tons of SO_2 or 0.1% when compared with EPA estimates.

Wyoming

Issues with Wyoming's data are as follows:

- At the Naughton plant, the 912 tons of SO_2 from an unmatched boiler are assigned to the SCC code for chemical manufacturing, when the emissions are actually from a utility coal boiler.
- Wyoming has provided fixes for six plants with incorrect SO_2 control efficiencies:
  - For Dave Johnston, the 7,085 tons of SO_2 from boiler BW44 incorrectly has an SO_2 control efficiency of 0% for this boiler; they provided an SO_2 control efficiency of 53.0%.

  - For Naughton, the 5,488 tons of SO_2 from boiler 3 incorrectly has an SO_2 control efficiency of 0%; they provided an SO_2 control efficiency of 77.0%.
  - For Wyodak, the 8,144 tons of SO_2 from boiler BW91 incorrectly has an SO_2 control efficiency of 0%; they provided an SO_2 control efficiency of 61.4%.
  - For Laramie R Station, the 10,382 tons of SO_2 from boilers 1, 2, and 3 incorrectly have SO_2 control efficiencies of 0%; they provided an SO_2 control efficiency of 81.0% for these three boilers.
  - For Neil Simpson II, the 710 tons of SO_2 from boiler 2 incorrectly has an SO_2 control efficiency of 0%; they provided an SO_2 control efficiency of 92.1%.
  - For Jim Bridger, the 19,332 tons of SO_2 from boilers BW71, BW72, BW73, and BW74 incorrectly have SO_2 control efficiencies of 0%; they provided SO_2 control efficiencies of 77.0%, 77.0%, 77.0%, and 85.0%, respectively, for these four boilers.
- At the Wyodak plant, boiler BW91 is associated with a single stack, not the two stacks provided; however, they did not state which of the two stacks was correct.
- At the Jim Bridger plant, boilers BW71, BW72, BW73, and BW74 are associated with a single stack each, not the two stacks each provided; however, they did not state which of the two stacks was correct in each case.
- The Neil Simpson 1 plant had inaccurate coordinates; they agreed with the latitude value of 44.250 degrees to replace the previous value of 43.528 degrees
- The Naughton plant had inaccurate coordinates; they agreed with the latitude value of 41.757 degrees to replace the previous value of 42.849 degrees.
- The Wyodak plant had inaccurate coordinates; they agreed with the latitude value of 44.2833 degrees to replace the previous value of 43.528 degrees.
- Wyoming agreed with the stack height, stack diameter, stack temperature, stack velocity, and stack flow that we provided to replace the stack parameters in the file for the following 15 boilers:
  - Wyodak's boiler BW91
  - Dave Johnston's boilers BW41, BW42, BW43, and BW44
  - Naughton's boilers 1, 2, and 3
  - Laramie R Station's boilers 1, 2, and 3
  - Jim Bridger's boilers BW71, BW72, BW73, and BW74.
- Wyoming provided updated stack height, stack diameter, stack temperature, stack velocity, and stack flow to replace the stack parameters in the file for the following 3 boilers:
  - Neil Simpson 1 (696 tons of SO_2 from boiler 5)
  - Osage (894 tons of SO_2 from boiler 1)
  - Neil Simpson II's boiler 2.
- Wyoming did not provide stack height, stack diameter, stack temperature, stack velocity, and stack flow values for Osage's boilers 2 and 3, and none are available.

Overall, Wyoming utility SO_2 emission totals for 1996 are underestimated by 14,507 tons of SO_2 or 14.4% when compared with EPA estimates.

Wyoming partially responded regarding utility discrepancies.