AIR QUALITY MODELING REPORT

PERIODIC ASSESSMENT
OF
NITROGEN DIOXIDE
PSD INCREMENT CONSUMPTION
IN
SOUTHWEST COLORADO

PHASE I

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Colorado Department of Public Health & Environment
Air Pollution Control Division
Technical Services Program
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1. Executive Summary

1.1. Goals

The primary goals of this study are to:

- Develop comprehensive inventories of Prevention of Significant Deterioration (PSD) increment consuming emissions for nitrogen oxides (NOx) in southwest Colorado;
- Develop meteorological fields as necessary for input to the Industrial Source Complex (ISC3) and CALPUFF models;
- Setup and run the ISC3 and CALPUFF models for appropriate near-field and far-field receptors, respectively;
- Compare modeled concentration estimates with appropriate Class I and Class II NO_2 increments. The Class I nitrogen dioxide increment is 2.5 micrograms per cubic meter on an annual basis. The annual Class II nitrogen dioxide increment is 25 micrograms per cubic meter.

1.2. Project Phases

For convenience, the Division divided this increment study into two phases. The first phase (this study), estimates increment consumption over a broad geographic area (including federal Class I areas) and identifies "hot spots"[1] for additional study. A "phase 2" study is planned as a follow-up to this study to examine existing increment consumption at a hot spot near the Williams Field Services PLA-9 compressor station.

1.3. Public and Peer Review

This report was initially published as a draft report in July 1999. The draft document was published on the Division's Internet site. In addition, copies were sent to a representative group of stakeholders, including most of the source operators with the largest sources in the study area.[2] A sixty-day review deadline was set. During the review period, comments were received from Red Cedar Gathering, the New Mexico Environment Department, and the National Park Service. All technical comments received have been addressed in this report. In one case, the comments cast doubt on the accuracy of data used in the study and stated that the study has not treated sources with equal scrutiny. For example, building downwash effects were not addressed for all sources.

The Division acknowledges that all sources in the study area were not treated with equal scrutiny. In fact, technically based professional judgement was used to determine which sources had high enough emissions to merit a refined analysis to estimate hot spot impacts from building downwash. It was beyond the scope of this study to model every source with building downwash. That is, this is not a definitive study. Nevertheless, it

[1] In this study, a "hot spot" is defined as an area of relatively high concentration where increment violations might be occurring.

[2] The Division sent copies of the draft phase I report to U.S. EPA Region VIII, U.S. Forest Service, National Park Service, U.S. Bureau of Land Management, Southern Ute Indian Tribe Department of Energy, Colorado Petroleum Association, Environmental Defense Fund, Williams Field Services, Amoco Production Co., El Paso Natural Gas Co., Red Cedar Gathering, and Northwest Pipeline Co.

does provide a reasonable estimate of existing increment consumption in the study area. In addition, refined hot spot modeling was not done for sources that do not have permits issued by the Division. In fact, many sources on Southern Ute Indian Tribe lands have permits issued by EPA. These simplifications were necessary to complete the study in a reasonable time frame with the allocated resources.

With respect to the comment that some source data are not accurate, the Division sent a letter to invite the submission of more accurate data. As of October 29, 1999, revised data have not been received from any source operators; thus, no changes to source data have been made for the final report. When and if revised data are received for sources in the study area, the data will be considered for use in the next increment study in this area.

Finally, one comment stated that "APCD asserts their minor source baseline date for NOx (March 30, 1989) applies to sources located within the exterior boundaries of the Southern Ute Indian Reservation. We believe that this jurisdictional issue is open to interpretation and needs to be addressed with affected parties to establish the most appropriate date in Indian country." The Division referred this question to U.S. EPA Region VIII. A letter from EPA states that the Division's use of Colorado's minor source baseline date is correct in this case, even for sources on the Southern Ute Indian reservation. This issue is discussed in depth in section 28.

1.4. Regulations

Federal law requires Colorado to have legally enforceable procedures in place to prevent construction/modification of a source where it is determined that emissions from the projected activity would violate control strategies or interfere with attainment and maintenance of the National Ambient Air Quality Standards (NAAQS) (40 C.F.R. 51.165-166). A major part of Colorado's control strategy for PSD areas is compliance with increment ceilings. Additionally, federal law requires the State to review its PSD plan on a periodic basis to ensure it is adequate to prevent significant deterioration of air quality (i.e., to prevent increment violations). If the State's plan is found to be inadequate, Regulation No. 3, Part B, Section VII.A.4 requires that the state revise the plan.

State and federal law require the Colorado Air Quality Control Commission to revise the State Implementation Plan (SIP) to establish additional control measures if the Colorado Air Quality Control Commission (AQCC) determines that applicable increments are being violated. Possible mitigation measures could include more stringent emission control requirements for minor sources.

AQCC Regulation No. 3 requires major sources subject to PSD review to demonstrate compliance with increments through modeling during the permitting process. Cumulatively, the impacts from major sources and other increment consuming sources must be below 100% of the increment. But, according to Regulation No. 3, individual major sources are not allowed to consume more than 75 percent of the PSD increment.

In the early to mid-1990's, the Division averaged about one PSD application per year. In 1998 and 1999, more than 10 PSD applications were received. Historically, most new PSD sources and major modifications in Colorado have had insignificant impacts in ambient air; that is, ambient air impacts are less than the modeling significance levels established by EPA. This is usually because of tall stacks, relatively low emission rates, and good dispersion characteristics. Thus, the requirement for a cumulative impact analysis to estimate increment consumption is often not triggered as part of the permit process. Even in cases where the impacts from a new PSD source or modification are significant, the impact area from the source often covers a relatively small spatial area. Therefore, in Colorado, the PSD permitting process by itself has not allowed the Division to track PSD increment consumption across all baseline areas, particularly for nitrogen dioxide where the baseline area includes the entire State. Periodic increment studies such as this one allow PSD increment consumption to be estimated in a comprehensive manner across broad geographic areas.

According to a preliminary 1998 opinion by the Colorado Attorney General's office, rule making would be necessary before the Division could require a compliance demonstration with increments as a permit issuance criteria for minor sources or minor modifications. The AQCC probably has the statutory authority to promulgate a regulation requiring minor sources to demonstrate compliance with increments before a construction permit is issued. The case in favor of AQCC authority is strongest if a periodic PSD increment study reveals that such a control measure is necessary to avoid violations of applicable increments due to minor source growth.

This study provides a detailed review of nitrogen dioxide PSD increment consumption in southwest Colorado. As such, this study serves as a reference document to help evaluate the adequacy of Colorado's current regulations for protecting PSD increments.

1.5. Results

The study area is identical to the one used for the Southern Ute Indian Tribe draft Environmental Impact Statement (EIS) which was not yet finished at the time this study was done. The study area is 176 by 176 kilometers and is almost equally split between New Mexico and Colorado. Most of the point sources in the study area are in La Plata County, Colorado and San Juan County, New Mexico.

The level of precision of results in this report is not intended to imply a level of accuracy.

The estimated NOx emission rate from area and mobile sources used in this study is 9,024 tons/year in the study area. It is based on 1997 data. This compares to a total of 8,860 tons per year in 1989. Thus, overall area and mobile source emissions have increased by about 164 tons per year in the study area. Emissions from area sources account for the increase. Mobile source emissions from highway and non-road sources in the study area have decreased by about 86 tons per year since 1989. Since the increase in area and mobile sources is relatively small or negative in most grid cells, area and mobile source emissions have been included in the dispersion modeling for only those

few grid cells where there has been a significant increase in emissions since 1989. In particular, NOx area/mobile source emissions were modeled for Durango and Cortez. In Durango, area/mobile emissions increased by up to 32 tons per year in the 2-kilometer by 2-kilometer grid cells used in the modeling.

As of 1999, the total actual NOx emission rate from stationary sources in the Colorado portion of the study area is estimated to be about 7,190 tons per year. This compares to a baseline year (1989) estimate of 2,208 tons per year. Thus, increment-consuming emissions are estimated to be about 5,000 tons per year from Colorado point sources in the study area. In contrast, the New Mexico inventory for the study estimates increment-consuming emissions at about 23,500 tons per year. Thus, for the entire study area, increment-consuming point sources emit about 28,700 tons per year.

ISC3 modeling has been performed for both near-field and far-field receptors, but only the results at near-field receptors in Class II areas are recommended for use in decision-making for this study. The reason is that ISC3 is a steady-state Gaussian plume model that is not recommended for long-range transport modeling (i.e., source-to-receptor distances greater than 50 km). CALMET/CALPUFF is the recommended long-range transport model. It is a non-steady-state puff model that is well suited for the complex terrain and meteorology in this study area.

The focus of the ISC3 modeling is on the near-field areas less than 50 kilometers from sources of interest. The primary area of concern for Class II increments in the Colorado portion of the study area is La Plata County. Most of the sources in this relatively high emissions density area are contained within a 50-kilometer circle. Thus, ISC3 is the appropriate model to use for all of the Class II increment modeling, according to Appendix W of 40 CFR Part 51 (Guideline on Air Quality Models). Since some Class I receptors are less than 50 km from a given source, both ISCST3 and CALMET/CALPUFF have been used for the Class I modeling. Nevertheless, as discussed later, the Division believes that CALMET/CALPUFF provides the most reliable results for Class I receptors.

The Class I nitrogen dioxide (NO_2) increment is 2.5 micrograms per cubic meter ($\mu g/m^3$) on an annual basis. The maximum receptor at Mesa Verde National Park (MVNP) has an annual NOx concentration of 1.09 $\mu g/m^3$, according to the CALMET/CALPUFF modeling system.[3] The maximum receptor from CALMET/CALPUFF at the Weminuche Wilderness Area (Weminuche) has an annual NOx concentration of 0.51 $\mu g/m^3$. Therefore, modeled concentration estimates at both Mesa Verde National Monument and at the Weminuche Wilderness Area are well below the Class I NO_2 increment. In addition, due to the magnitude of the impacts at the Class I areas, it's clear that no major source in Colorado consumes more than 75 percent of the increment at MVNP or Weminuche.[4]

[3] In the CALMET/CALPUFF modeling, no atmospheric conversion of NO to NO_2 has been assumed; that is, it has been assumed that all NOx emitted exists as NO_2. In addition, it has been assumed there is no deposition.
[4] Regulation No. 3, Part B, § VII.A.5.a states that new sources and modifications shall consume no more than 75% of an applicable increment.

ISCST3 modeling was also performed for each Class I area, but the Division concluded that CALMET/CALPUFF is the more appropriate model to use. The ISCST3 results suggest that PSD Class I increments are not currently violated at the Weminuche Wilderness Area. The ISCST3 results are less clear for Mesa Verde National Park. One ISCST3 modeling analysis at Mesa Verde showed maximum nitrogen oxides (NOx) impacts of 2.61 $\mu g/m^3$. While this is slightly above the Class I increment of 2.5 $\mu g/m^3$ for NO_2, the estimate is based on the conservative assumption that all NO is converted to NO_2. Another ISC3 analysis using a different meteorological data set shows a maximum NOx impact of just over 1.64 $\mu g/m^3$. Not surprisingly for a steady-state model where the wind field is uniform spatially for each hour, the ISC3 results vary significantly with the meteorological data used. For the Class I analysis, there is not a single "correct" meteorological data set to use in a steady-state Gaussian model like ISC3 when over 700 point sources are being modeled. In fact, the Class I results from the ISCST3 model contain significant uncertainties and probably significantly overestimate impacts at Mesa Verde. Therefore, due to transport distances and complex terrain meteorology, the CALMET/CALPUFF model, which uses spatially varying meteorology, is the most appropriate model for estimating Class I impacts in this case.

In general, the modeling suggests that the Class II PSD increments in the Colorado portion of the study area are not being violated over broad geographic areas. In most areas, about 4 to 8 $\mu g/m^3$ of the Class II increment of 25 $\mu g/m^3$ has been consumed, assuming 75 percent of all emitted NOx exists as NO_2. Areas with modeled estimates over 15 $\mu g/m^3$ are isolated and restricted to small geographic areas immediately adjacent to large NOx sources. Given the inherent and reducible uncertainties in the emissions and dispersion modeling system, the ISCST3 estimates are probably on the high side.

Annual NO_2 concentrations between 1991 and 1996 at the Ignacio monitoring station vary from about 9 to 15 $\mu g/m^3$. Model performance measures with respect to the monitored ambient data were not calculated since the inventory in the model is for increment consuming emissions as opposed to total NOx emissions. In any case, a cursory comparison of the monitored values with the "regional" modeled increment consumption suggests the modeling results are in a reasonable range. The monitoring data also demonstrate that the existing ambient NO_2 concentration levels at the monitoring station are well below the NO_2 Class II increment. This provides further evidence that increments are not being violated regionally.

ISC3 results suggest that there is one isolated hot spot in La Plata County where there may be existing Class II PSD increment violations. Thus, the Division has worked closely with the source operator to perform quality assurance checks of the Division's modeling. Based on modeling done to date, this modeled violation may or may not actually exist. Further study is required.

In areas near large point sources with apparent increment violations, EPA's regulatory modeling approach requires the use of conservative assumptions to account for the atmospheric conversion of NO to NO_2. For example, the default value for the Ambient

Ratio Method assumes that 75% of NO is converted to NO_2. Various monitoring-based field studies and reviews of chemical/physical mechanisms suggest that an assumption of 75% conversion over estimates impacts significantly at fence-line receptors (i.e., at receptors within a few hundred meters of the stacks). While monitoring could provide useful information about NO_2 concentration levels in the atmosphere at a given point, it is often difficult to site a monitor at or near the location where the actual maxima from a point source occur. The recommended regulatory method (Ambient Ratio Method) of using monitoring to develop local conversion rates of NO to NO_2 are generally not valid in rural areas because there are too many clean days where the signal-to-noise ratios of the monitoring instruments do not allow reliable ratios to be computed. Thus, reliably estimating or monitoring the maximum NO_2 concentration near point sources is difficult at best.

Based on the results of this "phase I study," the following actions are recommended:

- It is recommended that a "phase II" study be done in the area around the Williams Field Services (WFS) PLA-9 facility. The intent of the "phase II" study is to resolve source-specific increment issues.
- WFS has agreed to voluntarily perform the "phase II" study as part of their efforts to perform modeling for a proposed modification at PLA-9. The phase II report with a refined modeling analysis should be submitted by WFS to the Division for review. The Division will complete the study if WFS does not complete it.
- If the apparent increment violations can be resolved through the "phase II" refined analysis, a copy of the report and the Division's review comments will be sent to the Commission as a follow-up to the phase I study.
- If increment violations exist in the "phase II" refined analyses, the procedures set forth in Regulation No. 3, Part B, Section VII may be triggered. Nevertheless, case specific issues would need to be reviewed before making such a decision. For example, a permit application for a modification at PLA-9 is expected in late 1999 or early 2000. If the modification is major for nitrogen dioxide, regulations require that compliance with the PSD NO_2 increments be demonstrated before the permit can be issued. Thus, it is possible that the increment issues surrounding PLA-9 will be resolved through the permitting process.

2. Introduction

The reasons for performing this periodic assessment of Prevention of Significant Deterioration (PSD) increment consumption in southwest Colorado are:

- To provide information that might help determine the adequacy of existing regulations to prevent significant deterioration of air quality;
- Federal land managers expressed concern about the effect growth is having on nitrogen dioxide increment consumption at Mesa Verde National Park, a federal Class I area;
- Federal law requires the State to review its PSD plan on a periodic basis to ensure it is adequate to prevent significant deterioration of air quality.

2.1. Goals

The primary goals of this study are to:

- Develop comprehensive inventories of Prevention of Significant Deterioration (PSD) increment consuming emissions for nitrogen oxides (NOx) in southwest Colorado;
- Develop meteorological fields as necessary for input to the Industrial Source Complex (ISC3) and CALPUFF models;
- Setup and run the ISC3 and CALPUFF models for appropriate near-field and far-field receptors, respectively;
- Compare modeled concentration estimates with appropriate Class I and Class II NO_2 increments. The Class I nitrogen dioxide increment is 2.5 micrograms per cubic meter on an annual basis. The annual Class II nitrogen dioxide increment is 25 micrograms per cubic meter.

2.2. Report Organization

The organization of this report tends to reflect the process used to perform the increment study. For example, there are numerous sections entitled "source-by-source PSD increment analysis…." Each of these facility-specific sections was written as a facility was reviewed for this study. If increment-consuming emissions appeared to be high enough to cause concern that increments were in jeopardy, facility-specific refined ISCST3 modeling was done and results were added to the section. If increment-consuming emissions were relatively low (e.g., below 100 tons per year) and the Division did not believe that increments were realistically in jeopardy, facility-specific refined ISCST3 modeling was not performed.

Once facility-specific sections of this report were complete, cumulative impact modeling was performed in Class I and Class II areas.[5] Fine receptor spacing (i.e., 100 meters receptor spacing or less) was used in areas with a high emission density and in areas with several large facilities in close proximity.

The results of the cumulative impact modeling analyses are presented in Section 29 – Summary.

[5] All areas of Colorado are classified as Class II with the exception of specially designated federal Class I areas. Two Class I areas, Mesa Verde National Park and the Weminuche Wilderness are within this study area.

2.3. Project Phases

For convenience, the Division divided this increment study into two phases. The first phase (this study), estimates increment consumption over a broad geographic area (including federal Class I areas) and identifies "hot spots"[6] for additional study. A "phase 2" study is planned as a follow-up to this study to examine existing increment consumption at a hot spot near the Williams Field Services PLA-9 compressor station.

2.4. Definition of "PSD Increment"

"A PSD increment is the maximum allowable increase in concentration that is allowed to occur above a baseline concentration for a pollutant. The baseline concentration is defined for each pollutant (and relevant averaging time) and, in general, is the ambient concentration existing at the time that the first complete PSD permit application affecting the area is submitted." (USEPA, 1990).

2.5. Major Source Baseline Date

The "major source baseline date" is the date after which actual emissions associated with construction (i.e., physical changes or changes in the method of operation) at a major stationary source affect the available PSD increment.

2.6. Minor Source Baseline Date

The "minor source baseline date" is the date the first complete PSD permit application is received by the permit-reviewing agency. It marks the date after which actual emission changes from all sources affect available PSD increment.

2.7. How Do Emissions from One State Affect Increments in Another State?

According to an EPA memo dated April 5, 1999 from Bill Harnett, Acting Director of the Information Transfer & Program Integration Division ("Request to Clarify Prevention of Significant Deterioration (PSD) Baseline Area and Corresponding Baseline Date for Breton National Wildlife Refuge and Wilderness Area"):

> *When you calculate the amount of increment consumed in a particular baseline area, only the minor source baseline date applicable to that baseline area is relevant. Baseline areas are limited to intrastate regions because of an EPA policy that prevents emissions from a source in one State from triggering the minor source baseline date (and establishing the baseline area) in another State. See 45 FR at 52716, August 7, 1980. However, once the minor source baseline date and corresponding baseline area are established in any portion of a State, EPA believes that any change in air quality occurring in such area should affect the PSD increments for the area regardless of the location of any source contributing to the change. This is consistent with Congress' intent that the maximum allowable increase in pollutant concentration (increment) in a baseline*

[6] In this study, a "hot spot" is defined as an area of relatively high concentration where increment violations might be occurring.

> *area generally be measured against the area's change in air quality which occurs following the establishment of its minor source baseline date. See statutory definition of "baseline concentrations" at section 169(4) of title I of the Clean Air Act.*
>
> *Clearly, sources located outside the affected baseline area may contribute to a change in air quality within the affected baseline area. For emission changes from such sources to affect the increment in the same way as emissions generated inside the affected baseline area, it is necessary to relate those changes to the area's minor source baseline date. Thus, as explained in our response to question 1, the only minor source baseline date relevant to increment consumption at Breton is the minor source baseline date established for the baseline area associated with Breton.*

For this study, the NO_2 minor source baseline date is March 30, 1989 in Colorado and June 6, 1989 in New Mexico. Fortunately, these two dates are close enough together that differences between the baseline dates should not affect many (if any) sources. Using the procedures outlined by EPA (above), any sources in New Mexico whose emissions increased or decreased after Colorado's minor source baseline date are increment consuming *in Colorado,* even if the source is baseline in New Mexico. This means that a source in New Mexico that started operating in May 1989, for example, would NOT consume increment in New Mexico, but would consume increment in Colorado.

2.8. Regulations

Federal law requires Colorado to have legally enforceable procedures in place to prevent construction/modification of a source where it is determined that emissions from the projected activity would violate control strategies or interfere with attainment and maintenance of the National Ambient Air Quality Standards (NAAQS) (40 C.F.R. 51.165-166). A major part of Colorado's control strategy for PSD areas is compliance with increment ceilings. Additionally, federal law requires the State to review its PSD plan on a periodic basis to ensure it is adequate to prevent significant deterioration of air quality (i.e., to prevent increment violations). If the State's plan is found to be inadequate, Regulation No. 3, Part B, Section VII.A.4 requires that the state revise the plan.

State and federal law require the Colorado Air Quality Control Commission to revise the State Implementation Plan (SIP) to establish additional control measures if the Colorado Air Quality Control Commission (AQCC) determines that applicable increments are being violated. Possible mitigation measures could include more stringent emission control requirements for minor sources.

AQCC Regulation No. 3 requires major sources subject to PSD review to demonstrate compliance with increments through modeling during the permitting process. Cumulatively, the impacts from major sources and other increment consuming sources must be below 100% of the increment. But, according to Regulation No. 3, individual major sources are not allowed to consume more than 75 percent of the PSD increment.

In the early to mid-1990's, the Division averaged about one PSD application per year. In 1998 and 1999, more than 10 PSD applications were received. Historically, most new PSD sources and major modifications in Colorado have had insignificant impacts in ambient air; that is, ambient air impacts are less than the modeling significance levels established by EPA. This is usually because of tall stacks, relatively low emission rates, and good dispersion characteristics. Thus, the requirement for a cumulative impact analysis to estimate increment consumption is often not triggered as part of the permit process. Even in cases where the impacts from a new PSD source or modification are significant, the impact area from the source often covers a relatively small spatial area. Therefore, in Colorado, the PSD permitting process by itself has not allowed the Division to track PSD increment consumption across all baseline areas, particularly for nitrogen dioxide where the baseline area includes the entire State. Periodic increment studies such as this one allow PSD increment consumption to be estimated in a comprehensive manner across broad geographic areas.

According to a preliminary 1998 opinion by the Colorado Attorney General's office, rule making would be necessary before the Division could require a compliance demonstration with increments as a permit issuance criteria for minor sources or minor modifications. The AQCC probably has the statutory authority to promulgate a regulation requiring minor sources to demonstrate compliance with increments before a construction permit is issued. The case in favor of AQCC authority is strongest if a periodic PSD increment study reveals that such a control measure is necessary to avoid violations of applicable increments due to minor source growth.

This study provides a detailed review of nitrogen dioxide PSD increment consumption in southwest Colorado. As such, this study serves as a reference document to help evaluate the adequacy of Colorado's current regulations for protecting PSD increments.

3. Emission Inventory

The inventory process in Colorado involved development of three different inventories:

- ***Baseline Date Inventory***. It includes all sources that existed before the minor source baseline date in Colorado. The NO_2 minor source baseline date in Colorado is March 30, 1989 and June 6, 1989 in New Mexico. Nevertheless, only Colorado's minor source baseline date is relevant for receptors located in Colorado (see section 2.7).
- ***Current Year Inventory.*** It includes all sources that currently exist. To optimize the use of State resources and existing inventories, 1997 has been selected as the period for the "current year" inventory for area and mobile sources because it is a key year for other regulatory inventories that are being or have been generated for Colorado. The stationary point source inventory as obtained from EPA's Aerometric Information Retrieval System (AIRS) and from nearby States are based on early 1999 through June 1999 data.
- ***NOx PSD Increment Inventory***. It is based on a comparison of the "baseline date inventory" with the "current year inventory."[7] Positive emission rates are used for increment consuming sources, negative emissions are used for increment expanding emissions.

Actual, as opposed to allowable, emission rates have been used as much as possible, as obtained from Air Pollution Emission Notices (APENs), permit files data, and source operators. It's not clear if all emission estimates provided by New Mexico are based on actual emissions or if some are based on allowables. If actual emission rates are not available (particularly for small sources with NOx emission rates less than 20 tons per year) or cannot be reliably estimated, allowable (i.e., design capacity) emission rates have been used. For a given facility, if allowable emissions are used for one inventory (e.g., current year inventory), then allowables were also be used for other inventories (e.g., baseline year inventory).

In this study, when information about the startup date of a facility was not available, in most cases it has been assumed that the source is increment consuming. That is, the results err on the side of over estimating increment consumption.

Note that the New Mexico stationary source increment inventory used in the modeling is not presented in this inventory section. Refer to section 30 – Data Access - to find out how to obtain a copy of the New Mexico inventory used in this study.

3.1. Methodology Overview

The baseline date inventory consists of sources that existed on the minor source baseline date and appropriate changes at major sources since the major source baseline date.

[7] Currently, the "minor source baseline date" on the Southern Ute Reservation in Colorado is considered to be the same as the date for the section 107 areas in which the Reservation is located. Since Colorado has designated that the nitrogen dioxide baseline area includes the entire State, Indian reservations within Colorado should use the State's minor source baseline date. This decision is based on the fact that the definitions of "baseline area" and "minor source baseline date" are tied to the attainment or unclassifiable area designations under section 107 that have been promulgated under Part 81. In Part 81, no reservations have been listed as separate section 107 areas unless they are nonattainment areas. Refer to section 28 for language from EPA regarding this issue.

The stationary source inventory data for New Mexico was supplied by the the New Mexico Air Quality Bureau. All nearby sources of importance are located in New Mexico. Fortunately, New Mexico maintains detailed PSD increment inventories. The Division did research the history of the Four Corners Power Plant and the San Juan Generating Station in New Mexico (see sections 24 and 25).

Preliminary inventory work performed for the Southern Ute Indian Tribe (SUIT) draft Environmental Impact Statement (EIS) was reviewed when developing the inventory for this study. It's important to note that the focus of this study, unlike an EIS, is on "existing" increment consumption as opposed to anticipated increment consumption from future growth.

The emission rates in the "baseline date inventory" and in the "current year inventory" reflect source operations over the preceding two (2) years of operation from applicable dates, unless some other time period is considered to be more representative of normal operation [see 51.166(b)(21)(ii)] (USEPA 1990, USEPA 1991). For increments with annual averaging periods such as the NO_2 increment, the average annual baseline emission rate is generally calculated over the 2-year period proceeding the applicable minor or major source baseline date.

3.2. Mobile/Area Source Emission Inventory

Emissions from sources not explicitly listed in AIRS (e.g., small stationary sources and mobile sources) are based on EPA's National Air Pollutant Emission Trends (NET) database (USEPA 1997a; USEPA 1997b; USEPA 1998a).[8] The county-wide emission estimates has been allocated spatially by the Division with the ARC/INFO Geographic Information System (GIS) and/or with ArcView.[9]

The Division has performed quality assurance checks to verify that the emission estimates are reasonable.

Gridded inventories (2-km by 2-km grid cells) have been generated for the baseline date inventory and for the current year inventory. An increase in emissions in a given grid cell is assumed to reflect increment consumption. A decrease is assumed to reflect increment expansion.

The inventory is based on the methodology used in the EPA 1996 National Emissions Trends (NET) Inventory, which is a county-by-county inventory. The Inventory is for oxides of nitrogen emissions for the study area. The study area is composed of all of La Plata County and portions of Archuleta, Conejos, Dolores, Hinsdale, Mineral, Montezuma, Rio Grande, San Miguel, San Juan in Colorado; and portions of San Juan and Rio Arriba in New Mexico. The NET inventory is broken out by source classification code (SCC), for area, mobile and point sources. Point sources were inventoried separately, as discussed elsewhere in this report.

[8] Additional NET information is available on the Internet at http://www.epa.gov/ttn/chief/ei_data.html.
[9] ArcView is made by Environmental Systems Research Institute, Inc. (ESRI), the makers of ARC.INFO.

The NET inventory was adjusted to the base year of interest by a ratio based on the county population for such area sources as residential and commercial fuel combustion, aircraft and railroads.

Highway vehicle emissions were calculated based on vehicle miles traveled (VMT). The VMT was obtained from the Colorado Department of Transportation (CDOT) and was based on the Federal Highway Administration's Highway Performance Management System (HPMS). The EPA Mobile5 emission factor model was run for the 1989 and 1997 base years to calculate the emission factors for highway vehicles, based on the speed and temperature inputs used in the NET inventory.

Emissions from non-road mobile sources (such as lawn mowers and forklifts) were calculated using the EPA Non-road Emission Factor Model. Area and mobile sources were apportioned to grid cells through the use of the geographical information systems (GIS), Arc-Info and ArcView. Population by census tract was used to apportion area sources, and the arcs that represent the street system in each county were used to apportion mobile sources. Figure 1 shows the street network in the Durango area overlaid on a 1993 satellite image from USGS. The arcs used are a fair approximation of the street network

Figure 1. Example showing overlay of roads (bright white lines) on a Digital Orthophoto Quad (aerial photograph). Roads such as the ones shown here were used to spatially allocate county-level mobile source emission estimates.

Figure 2 shows the study area and presents a summary of study area non-point source emissions increases from the 1989 base year to 1997.

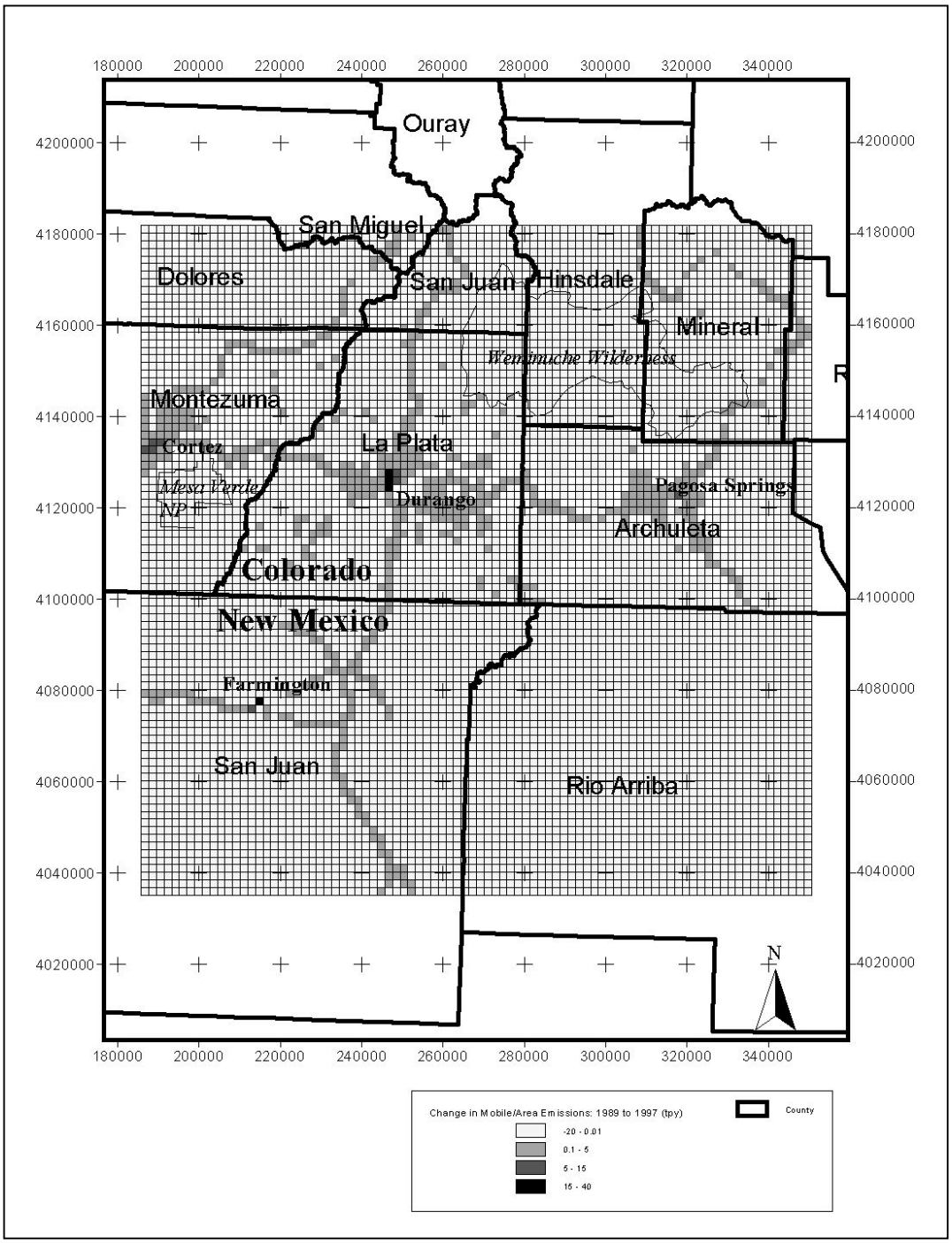


Figure 2. The change in mobile and area source (non-point) NOx emissions between 1989 and 1997. White cells show increment expansion or no change. Black cells show areas where NOx emissions have increased 15 to 40 tons per year.

Table 1 is a summary of the non-point source emissions inventory for the study area. The change in emissions from 1989 to 1997 is also illustrated in Figure 2 above. Figure 3, Table 2, Table 3, and Table 4 provide a summary of the NOx inventory for La Plata County.

Table 1. Study area emissions summary (tons per year).

Year	Emissions Tons/Year			
	Highway	Non-Road	Area	Total
1997	5,222	1,951	1,852	9,024
1989	5,262	1,996	1,602	8,860
Change 97-89	-40	-46	250	164

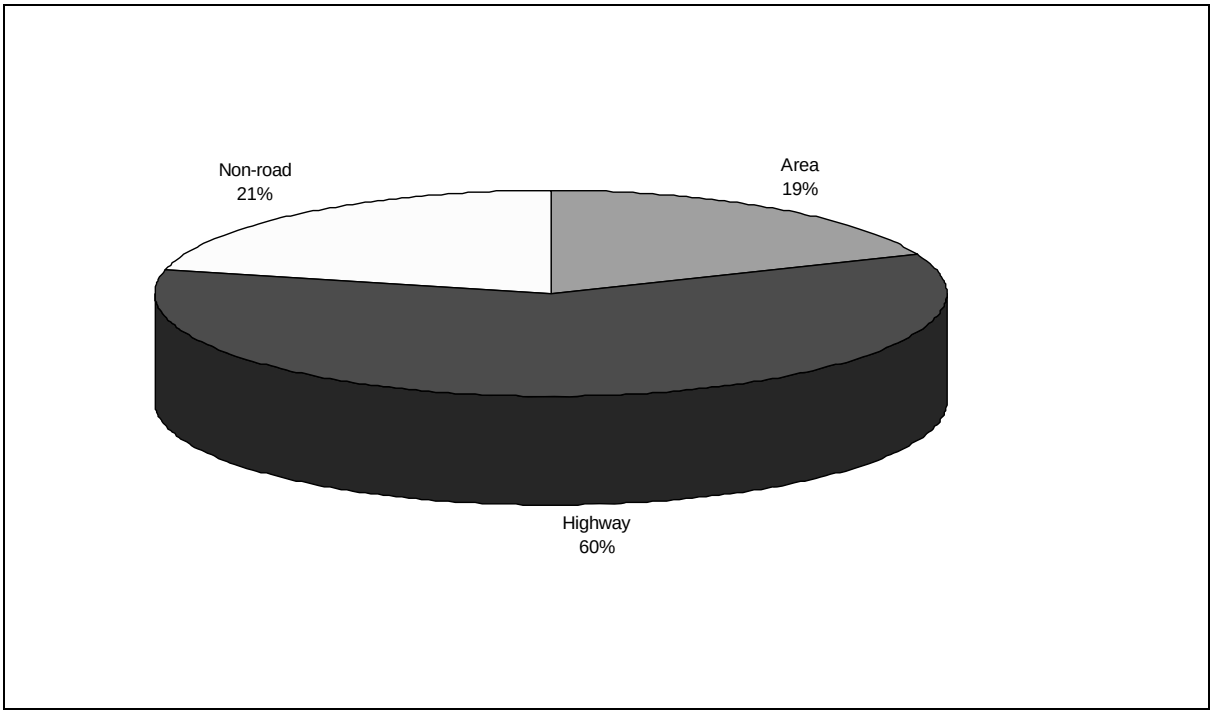


Figure 3. Pie chart showing recent highway, non-road, and area source emission estimates in La Plata County.

Table 2. La Plata County "area" source NOx emission estimates for 1996.

Source Class	SCC	NOX (tons/year)
ind. Coal	2102002000	4.8
ind. Dist oil	2102004000	1.8
ind. Resid. Oil	2102005000	0.1
ind. Nat. gas	2102006000	128.6
comm/inst coal	2103002000	0.9
comm/inst oil	2103004000	6.8
comm/inst gas	2103006000	37.3
residential coal	2104002000	1.0
residential oil	2104004000	0.1
residential gas	2104006000	49.1
wood fireplaces	2104008001	29.8
gen av aircraft	2275050000	3.0
Unpaved Airstrips	2275085000	0.1
rail	2285002000	287.0
Oil and Gas Production: SIC 13	2310000000	0.0
ind. Incin	2601020000	0.5
comm/inst incin	2601030000	0.8
Waste Disposal, Treatment, & Recovery Open Burning Industrial Total	2610010000	5.7
residential incin	2610030000	
open burning indust	2630020000	0.0
Managed Burning, Prescribed	2810015000	0.3
structural fires	2810030000	0.6
TOTAL		**558.4**

Table 3. Non-road model 1997 NOx emissions (tons per day).

Classification	La Plata (tons/day)
Agricultural Equipment	0.439
Airport Equipment	0.002
Commercial Equipment	0.066
Construction and Mining Equipment	1.113
Industrial Equipment	0.100
Lawn and Garden Equipment (Com)	0.036
Lawn and Garden Equipment (Res)	0.006
Logging Equipment	0.000
Pleasure Craft	0.005
Railroad Equipment	0.002
Recreational Equipment	0.105
TOTAL	1.874
tons/year 1997	**632**

Table 4 shows the 1997 highway vehicle inventory for La Plata County, and compares it to the 1996 EPA NET highway inventory. The two inventories compare very closely; even though in the EPA inventory, highway vehicles were apportioned to the county level by population, while in the Study Inventory, highway vehicles were apportioned by traffic counts.

Table 4. La Plata County highway vehicle emission estimates.

Highway Functional Class	1997 Study Inventory			1996 NET Inventory	
	Emissions	VMT		Emissions	VMT
	Tons/Year	Millions/Y		Tons/Year	Millions/Y
Interstate: Rural	0	0		653	151
Other Principal Arterial: Rural	562	172		412	121
Minor Arterial: Rural	0	0		269	79
Major Collector: Rural	168	53		221	65
Minor Collector: Rural	64	20		83	25
Local: Rural Toal	85	27		165	49
Interstate: Urban	0	0		3	1
Other Freeways and Expressways: Urban	0	0		3	1
Other Principal Arterial: Urban	326	129		8	3
Minor Arterial: Urban	120	47		6	2
Collector: Urban	0	0		2	1
Local: Urban	50	20		2	1
TOTAL	**1755**	**469**		**1829**	**498**

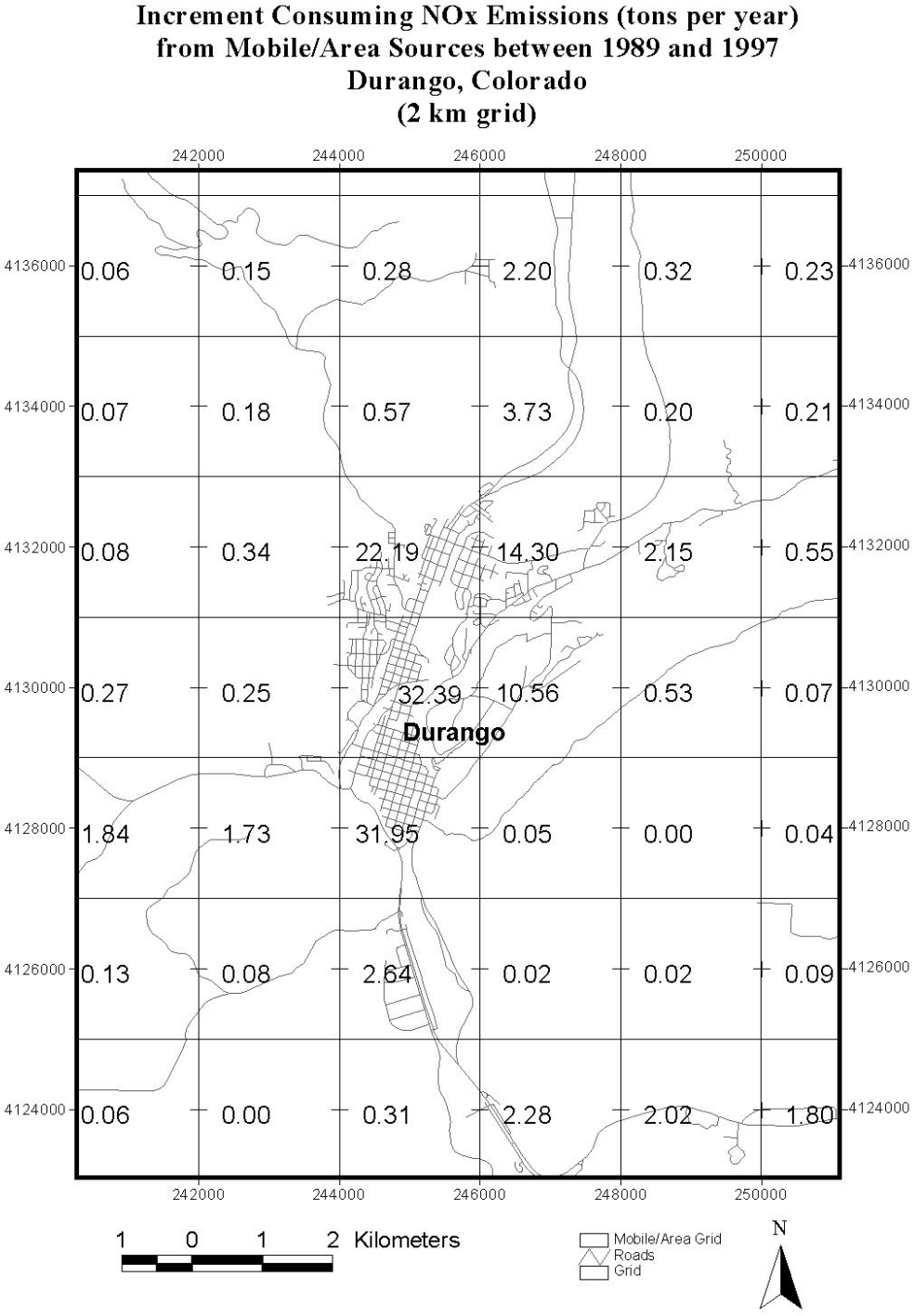


Figure 4. The change in area and mobile source NOx emissions between 1989 and 1997 in Durango, Colorado.

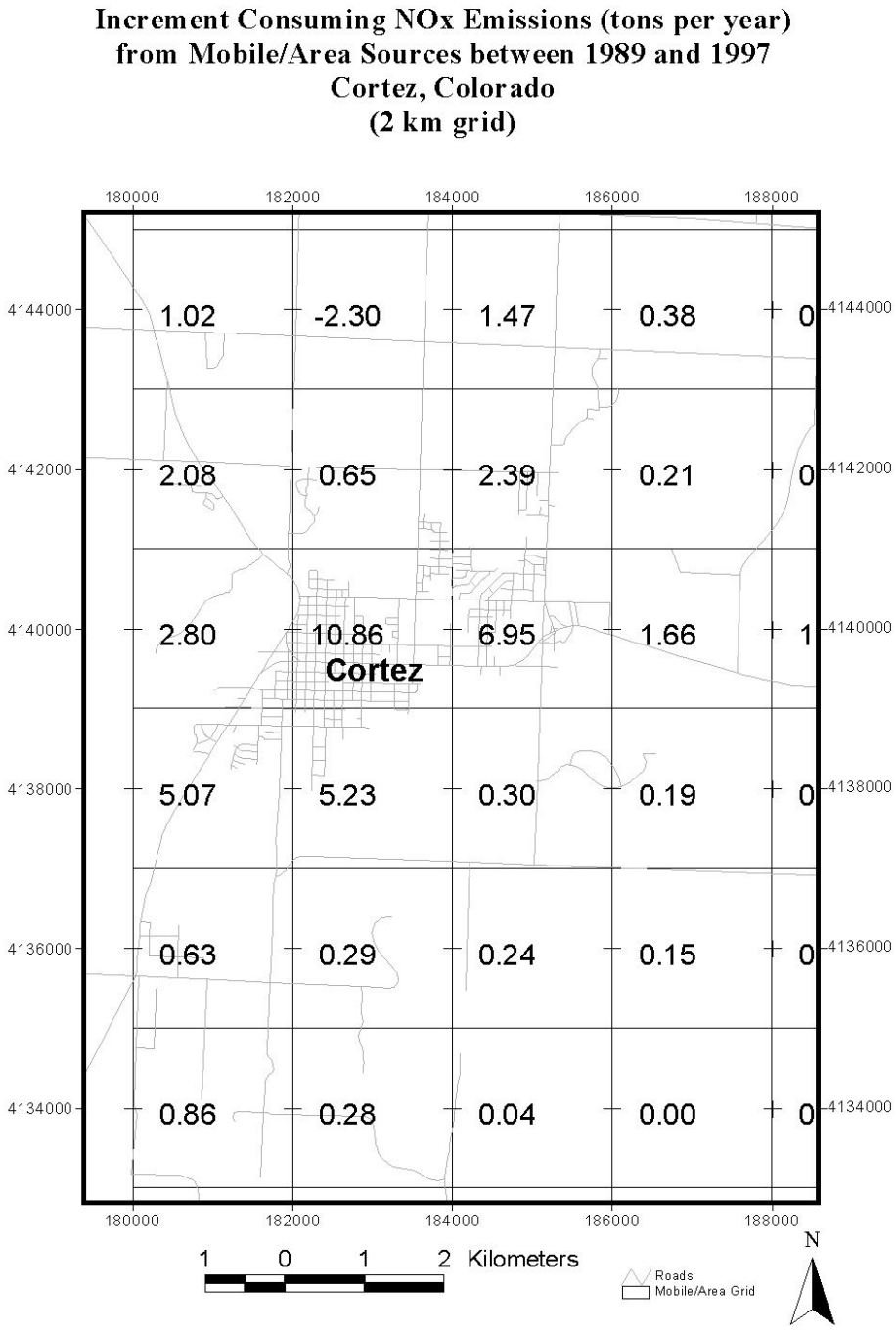


Figure 5. The change in NOx emissions from area and mobile sources between 1989 and 1997 in Cortez.

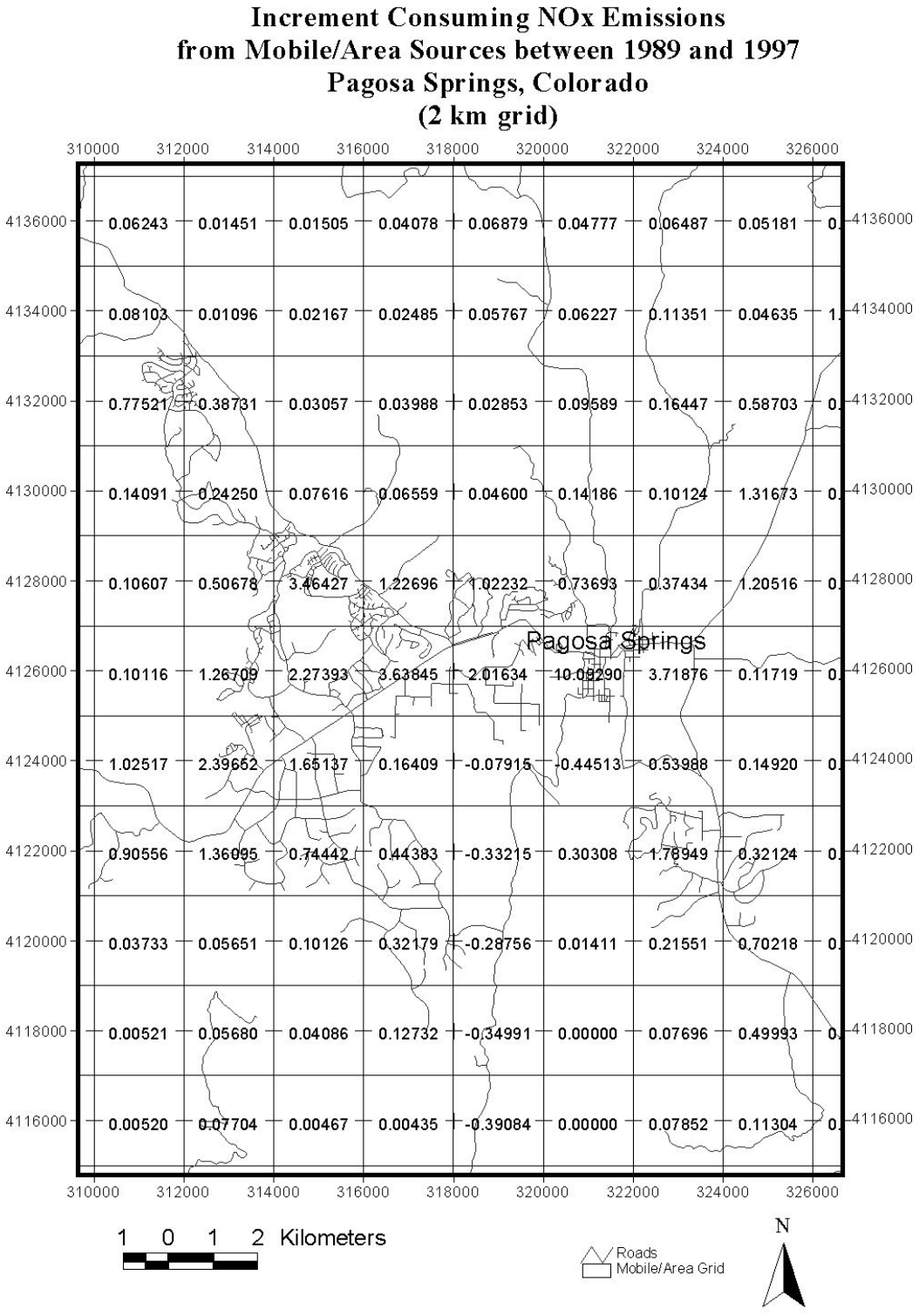


Figure 6. The change in NOx emissions from area and mobiles sources between 1989 and 1997 in Pagosa Springs.

3.3. Stationary Source Emission Inventory

For sources that are required to file Air Pollution Emission Notices (APENs) with the Division, the "current year inventory" is based on the actual emission rate that most realistically reflects the two (2) most recent years of operation. Due to the fact that APENs are not updated every year by every source, the Division has used actual emissions estimates from the most recent APEN in most cases.

The most challenging aspect of the inventory was to put together the "baseline date inventory." In Colorado, the first year where reasonably complete APENs are on-file with actual emission rates is 1992. Thus, in most cases, Title V permit review information and permit issuance dates have been used to determine the increment status of each unit at a facility. If sufficient information was not available to make a determination, the Division assumed the unit was increment consuming. Thus, the 1989 emission estimates are probably understated. Nevertheless, this provides for a conservative analysis.

The stationary source inventory procedure for sources located in Colorado was performed as follows:

i) ***Obtain Recent AIRS retrievals*** *for ALL NOx and SO_2 sources in SW Colorado.* The initial retrieval included all sources in Colorado south of 39° latitude and west of 105.5° longitude.

ii) ***Rank the sources*** by their actual annual emission rate; use the allowable emission rate if actuals are not available.

iii) ***Prioritize***. Sort the retrievals by the facility-wide NOx emission rate

iv) ***Generate Source History***. Review source histories from the Division's Title V operating permit program. For sources emitting less than 100 tons per year of NOx, review permit approval dates and permit numbers along with historical aerial photographs to determine which units are baseline. Starting with the highest ranked facility, review the data in the AIRS retrievals to determine if sufficient information is available to put together a source history that shows the date each source at the facility started operating. As many sources as possible were reviewed within the time frame available.

v) ***Determine the average actual emission rate for the "baseline date inventory."*** Ideally, this should be a 2-year average or "typical" annual emission rate for the baseline period, but single year estimates were used in most cases due to the fact that most sources don't update APENs every year.

vi) ***Determine the average actual emission rate for the "current year inventory."*** Review the most recent actual emissions reported by the source. In most cases, the most recent APEN actual emission estimates were used.

vii) ***Gather modeling-related data***. Obtain source parameters and geographic coordinates for each significant emissions point at a facility (if may be necessary to contact the source operator to complete this step). This involves detailed reviewed of Division data done starting with the largest source. The data elements below were developed for as many sources as possible with the time frame available. Conservative assumptions were used for sources in AIRS for which a detailed permit file review has not been conducted. These data elements are needed for BOTH the baseline date

AND the current date (in many cases, the parameters are expected to be the same for both periods; particularly for baseline sources that have not been modified):

- facility plot plan that includes source locations, buildings, fence line
- geographic coordinates for each emission point (latitude/longitude or UTM coordinates)[10]
- geographic coordinates that define the "fence line" or other barriers that define the "ambient air" boundary for the facility (if one exists)
- building dimensions (length, width, height) for facilities emitting more than 100 tons per year of increment consuming emissions
- stack height (meters)
- stack diameter (meters)
- stack gas exit velocity (meters/second)
- stack gas exit temperature (Kelvin)
- metadata whenever possible[11]

viii) ***Generate a "baseline date inventory database file."*** This includes all NOx sources that were operating as of March 30, 1989 (the minor source baseline date for NO_2 in Colorado). The exception to this rule is that actual emissions changes resulting from a physical change or change in the method of operation at major sources since the "major source baseline date" (February 8, 1988) should be EXCLUDED in the "baseline" inventory.[12] This may seem incorrect at first glance, but this procedure allows changes since the major source baseline date to be tagged as increment consuming emissions using "baseline" and "current" inventory comparison techniques. The baseline inventory database includes all modeling related data;

ix) ***Generate a "current year inventory" database file.*** It should include all NOx sources that are currently in operation. The inventory database should include all modeling related data;

x) ***Generate a "NOx PSD increment inventory database file.***" The inventory database should include all modeling related data. Compare the "baseline date inventory" and the "current year inventory" to determine if there are any differences other than emission rates. For example, compare stack parameters such as stack height and exit velocity and compare to see if buildings have been added to the facility. Then:

- If the are no differences, subtract the "current year" actual emission rate from the "baseline year" actual emission rate and archive the "difference" in a database. [positive differences in emissions indicate increment consumption; negative differences indicate increment expansion; this approach allows changes in actual emissions from baseline sources to be properly accounted for in the inventory]
- If there are significant differences between emission parameters such as stack height, exit velocity, or building location or dimensions, archive the baseline date

[10] Coordinates for most sources, particularly large ones, are based on UTM NAD27 coordinates.

[11] METADATA (METHODS) - a description of the methods used obtain the data. Metadata is important in determining if existing data are sufficient for regulatory decision-making.

[12] Excluding any increment consuming changes that occurred at major sources between the "major source baseline date" and the "minor source baseline date" will cause those sources to only show up in the "current year" inventory. Thus, the emissions are identified as increment consuming when the "baseline date" and "current year" inventories are compared.

emission rate as a negative value in the database AND, in addition, archive the current year emission rate as a positive value.

xi) ***Quality Assurance***. The draft phase I report was sent to source operators with large increment consuming sources in the study area.

3.4. Emission Inventory Summary

The estimated NOx emission rate from area and mobile sources used in this study is 9,024 tons/year in the study area. It is based on 1997 data. This compares to a total of 8,860 tons per year in 1989. Thus, overall area and mobile source emissions have increased by about 164 tons per year in the study area. Emissions from area sources account for the increase. Mobile source emissions from highway and non-road sources in the study area have decreased by about 86 tons per year since 1989. Since the increase in area and mobile sources is relatively small or negative in most grid cells, area and mobile source emissions have been included in the dispersion modeling for only those few grid cells where there has been a significant increase in emissions since 1989. In particular, NOx area/mobile source emissions were modeled for Durango and Cortez. In Durango, area/mobile emissions increased by up to 32 tons per year in the 2-kilometer by 2-kilometer grid cells used in the modeling.

Table 5. Increment consuming/expanding NOx emissions in the study area.

Highway Mobile Sources	Non- Road Mobile Sources	Area Sources	Stationary Point Sources	Total
-40	-46	250	28700	28864
Note: A negative sign indicates increment expanding emissions.				

As of 1999, the total actual NOx emission rate from stationary sources (not including the "area" sources cited above) in the Colorado portion of the study area is estimated to be about 7,190 tons per year. This compares to a baseline year (1989) estimate of 2,208 tons per year. Thus, increment-consuming emissions are estimated to be about 5,000 tons per year from Colorado point sources in the study area. In contrast, the New Mexico inventory for the study estimates increment-consuming emissions at about 23,500 tons per year. Thus, for the entire study area, increment-consuming point sources emit about 28,700 tons per year.

4. Air Quality Modeling Methodology

Model application is consistent with Appendix W of 40 CFR Part 51 - Guideline on Air Quality Models (*EPA Guideline*) and associated guidance (e.g., USEPA 1988; USEPA 1990; USEPA 1991, USEPA 1993).

The original protocol indicated that the CALMET/CALPUFF modeling would be based on the modeling done by Earth Tech, Inc. for the draft Southern Ute Indian Tribe (SUIT) Environmental Impact Statement (EIS) for oil/gas development. Since the draft SUIT EIS was not complete at the time this study was done, it could not be used. Nevertheless, many elements of the draft SUIT EIS protocol for the far-field analysis were used in this modeling effort.

4.1. Model Selection

The air quality models used were the Industrial Source Complex Short-Term (ISCST3) model dated 98356 and the CALMET/CALPUFF modeling system version 5.0 Level 990228.

4.1.1. ISCST3

ISCST3 has been selected to estimate near-field impacts in Class I and Class II areas. ISC3 is the current preferred EPA model for modeling impacts from a wide range of sources that might be present at a typical industrial source complex. The basis of the model is the straight-line, steady-state Gaussian plume equation. It uses Schulman-Scire and Huber-Snyder aerodynamic downwash algorithms for appropriate situations to estimate impacts when the plume is influenced by nearby structures such as buildings.

4.1.2. CALMET/CALPUFF

The primary niche for CALPUFF[13] is as a long-range transport model. In the near future, CALPUFF may be approved by EPA as the preferred long-range transport model and as a case-by-case model for near-field (<50 kilometers) situations where the dominating local meteorology is clearly non-steady state. It is a multi-layer, non-steady-state puff dispersion model which can simulate the effects of time- and space-varying meteorological conditions on pollutant transport, chemical transformation, vertical wind shear, and deposition.

While it is most appropriate in long-range transport applications at source-receptor distances of up to about 200 to 300 kilometers, it can also provide reasonable estimates at near-field receptors. In the near-field, it can simulate effects such as building downwash, transitional plume rise, partial plume penetration, and subgrid-scale terrain interactions.

[13] CALPUFF was developed by Joseph S. Scire, David G. Strimaitis, Robert J. Yamartino, and Xiaoming Zhang of EARTH TECH, formerly Sigma Research Corporation.

4.2. Model Setup and Application

Estimates of PSD increment consumption have been estimated with at least three different types of analysis: 1) an ISCST3-based facility-wide analysis, 2) an ISCST3-based cumulative impact analysis, and 3) a CALPUFF-based cumulative impact analysis in Class I areas within the domain.

4.2.1. Facility-Wide Analysis

Based on professional judgement, each stationary source in Colorado that has the potential to cause a violation of PSD increments by itself (without considering other sources) has been modeled separately with ISCST3. This includes major sources and large minor sources with increment consuming NOx emissions greater than 100 tons per year. A variety of factors were used to select sources for hot spot modeling, including source strength, dispersion characteristics, nearby terrain, and proximity to other sources.

Facility-wide modeling was done on an on-going basis as the inventory was developed for the study area.

The facility-wide analysis allowed the complex terrain impacts from a given facility to be analyzed. It also helped the Division decide if a given source should be modeled with or without building downwash parameters in the cumulative impact analyses.

Finally, the facility-specific analysis is intended to provide information to the AQCC regarding the impact from a given facility. For example, it allows the Division and AQCC to understand if a given facility by itself is causing a violation of applicable PSD increments.

One of the primary reasons for performing facility-specific modeling was to allow the Division the chance to review emission rates, stack parameters, and coordinates before the computer intensive cumulative impact modeling was done. Thus, it served as a QA/QC procedure for the data that were eventually used in the cumulative impact analyses. It also allowed the Division to involve source operators before the presentation of results to the Commission so that obvious errors and oversights could be corrected as early as possible.

Only sources in Colorado were targeted for the facility-wide hot spot modeling.

4.2.2. ISCST3-based Cumulative Impact Analysis

For the ISCST3 modeling, the “increment inventory” was explicitly modeled to estimate increment consumption (positive concentration). Increment expansion was not considered. It was either not applicable or would make little difference in the outcome of the modeling.

4.2.2.1. Selection of Dispersion Coefficients

Rural Pasquill-Gifford dispersion coefficients were used for the ISCST3 modeling.

4.2.2.2. Building Downwash

Direction-specific building wake effects were computed by the Division for the PLA-9 facility and for the EPNG Bondad facility. Building downwash parameters from the preliminary SUIT draft EIS inventory were used for a large number of sources.

4.2.2.3. Conversion of NO to NO_2

"The U.S. Environmental Protection Agency (EPA)-approved Gaussian dispersion model, ISCST3, can be used to determine oxides of nitrogen (NO_x) concentrations from combustion sources. The model does not contain a chemical transformation component that evaluates the formation of nitrogen dioxide (NO_2) from NO_x. As the National Ambient Air Quality Standards (NAAQS) set forth by EPA are in the form of NO_2, and not NO_x, the prediction of NO_2 concentrations is important. Since NO_2 is a subset of NO_x, it can be conservatively assumed that all NO_x is NO_2 (total conversion). Field studies have indicated that total conversion may overpredict impacts significantly, which is problematic in a regulatory setting. Reactive plume models exist which simulate the formation of NO_2 in the atmosphere, but these models require large amounts of input data which are not readily available at most rural sites. Regulatory agencies need a simple screening method that predicts ambient concentrations of NO_2 while ensuring protection of ambient air quality standards." (Uhl, Wong, Clary, Goodman, 1998)

"During the 1996 Regional/State/Local Modelers Workshop, a group of meteorologists and air modelers formed the ARM/OLM Workgroup to evaluate NO_x point source modeling issues and methods. The main concern of the Workgroup was the prediction of NO_2 concentrations from NO_x sources. To determine the issues that are relevant, numerous questions were asked by the members of the Workgroup. Is the current EPA guideline technique, Ambient Ratio Method (ARM), adequate? Does the current guidance for applying ARM meet our needs? What problems are state and local permitting agencies experiencing in implementing ARM? Is ARM appropriate for rural areas? Is ARM appropriate for long range transport? Is ARM appropriate for building wake effect situations?" (Uhl, Wong, Clary, Goodman, 1998)

"There was consensus among the Workgroup members that the current EPA guidance is inadequate. For example, the ratio of NO_2 to NO_x, whether it be the national default of 0.75 or site-specific, is applied to receptors very near the source (within 1000 meters) as well as to receptors very far from the source (50 kilometers or more from the source). The ARM national default ratio may be too conservative near the source as there is not enough time for even 75% of the NO_x to be converted to NO_2. Under the current EPA guidance, the ARM ratios are applied uniformly without variation at distances further downwind. In general, the NO_2:NO_x ratio increases at distances further from the source. The ratios may actually differ at receptors influenced by building downwash or in complex terrain. At distant Class I areas where concentrations are of concern, the ARM national default ratio may not be conservative. Perhaps total conversion should be assumed

for receptors more than 50 km from the source. The national default ratio is based on NO_2 and NO_x data collected at urban sites and may not be appropriate for rural areas where NO_x concentrations are lower and ambient concentrations of ozone (O_3) and hydrocarbons, which promote the formation of NO_2, are also lower. The inadequacies of ARM strongly support a proposal for an additional screening method to predict ambient NO_2 concentrations, like the Ozone Limiting Method (OLM), until a more robust screening model can be developed" (Uhl, Wong, Clary, Goodman, 1998)

In this study, the national default value of 0.75 from EPA's Ambient Ratio Method (ARM) has been used for near-field impacts. A 100 percent conversion rate was used for far-field receptors. The ozone limiting method (OLM) has not been used in this study.

4.2.2.4. Treatment of Terrain

Elevation values were used for all receptors. U.S. Geological Survey (USGS) Digital Elevation Model (DEM) data were used in all areas. USGS 7.5 minute DEMs[14] were used in most areas for the ISCST3 modeling, particularly for all hot spot modeling. The 1:250,000[15] data were used only for the CALPUFF modeling and for distant source elevations.

The USGS 1:250,000 DEM data were not satisfactory in most area for resolving terrain. Entire ridges and drainages were missing or poorly resolved with the 1:250,000 scale DEM data.

4.2.2.5. Receptor Network

Professional judgement was used on a case-by-case basis to define receptor grids. Factors such as topography, density of nearby sources, meteorology, and requirements of the selected model were considered when selecting receptors. In general, the networks were consistent with EPA and Colorado guidance.

The following approach was generally be used, but additional receptor grids or discrete receptors were used as necessary in complex terrain areas:

- up to 1 kilometer from large sources – grid with 100-meter receptor spacing;
- from 1 to 3 kilometers from large sources – grid with 250-meter spacing;
- in all other areas - grid with 500 meter spacing; although 2-kilometer spacing was used in remote locations (e.g, Class I area) far from source areas.
- along fence line of large sources - 50 meters receptor spacing (100-meter spacing was appropriate at more distant locations when the fenced area was extensive)

[14] The 7.5-minute DEM data files are digital representations of cartographic information in a raster form. DEMs consist of a sampled array of elevations for a number of ground positions at regularly spaced intervals. Each 7.5-minute DEM is based on 30- by 30-meter data spacing with the UTM projection. Each block provides the same coverage as the standard USGS 7.5-minute map series.

[15] The 1-Degree DEM (3- by 3-arc-second data spacing) provides coverage in 1- by 1-degree block. One-degree DEM's are also referred to as "3-arc second" or "1:250,000 scale" DEM data.

- if there was no fence line – grids with 50 or 100 meter receptor spacing.

If the modeled maximum in an area occurs in a “coarse” receptor grid area, a "fine" grid was used to resolve the maximum impact area.

Receptors were omitted from fenced property areas of the facility under review during the facility-specific phase of this study. But, if there is not a physical barrier such as a fence or wall, receptors were located on facility property.

4.2.2.6. Meteorology

One-year of sequential hourly meteorological data from the Florida monitoring site was used for the final Class II ISCST3 modeling in Colorado. One exception is that the Buena Vista, NM site was used for modeling at the Williams Field Services PLA-9 facility near the New Mexico border. The rationale for using Buena Vista for PLA-9 modeling is discussed in section 5. For modeling impacts at Mesa Verde National Park, the Val Verde, NM site was used because it appears to be the most representative site for regional transport from the areas with the highest NOx emissions density. Similarly, the Florida site is most appropriate for transport into the Weminuche Wilderness Area from nearby source areas in Colorado. All meteorological data sets used in the ISCST3 modeling are PSD quality and have been approved by the Division or by the State of New Mexico for use in regulatory modeling.

The figure on the next page shows each of these meteorological monitoring sites.

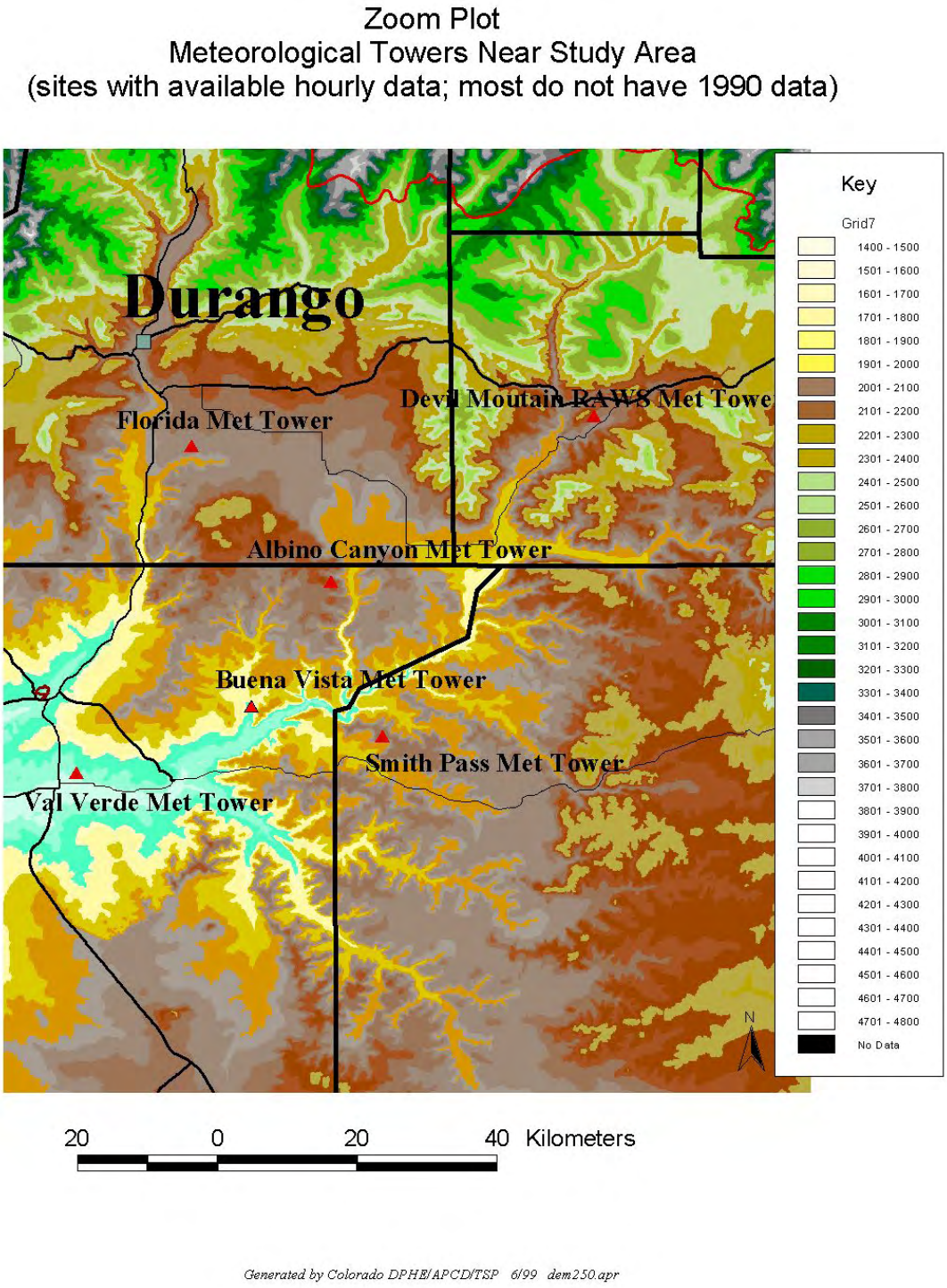


Figure 7. Topographical map showing meteorological sites.

4.2.3. CALMET Application

CALMET was run for the year 1990. CALMET is based on the Diagnostic Wind Model (Douglas, S. and R. Kessler, 1988). It has been significantly enhanced by Earth Tech, Inc. (Scire J.S., E.M. Insley, R.J. Yamartino, and M.E. Fernau, 1995). A UTM projection coordinate system has been used.

CALMET uses a two step approach to calculate wind fields. In the first step, an initial-guess wind field is adjusted for kinematic effects of terrain, slope flows, and terrain blocking effects to produce a Step 1 wind field. In the second step, an objective analysis is performed to introduce observational data into the Step 1 wind field. In this application, the initial guess wind field is based on the Penn State MM4-FDDA prognostic model.

The 80 kilometer MM4 data that was used as the initial guess field is recognized to be too coarse to capture the complex flow regimes that occur in the study area. Nevertheless, as has been done in the SUIT EIS modeling, the initial guess meteorological fields are based on the MM4 1990 meteorological data.[16] The 1990 MM4 runs are based on a resolution of 80 kilometers at hourly intervals with about 20 levels of data vertically. The accuracy of the meteorological modeling could probably be greatly improved if the non-hydrostatic Penn State University/National Center for Atmospheric mesoscale model (MM5) were used with higher resolution.[17] Unfortunately, the cost to develop MM5 fields for this study was prohibitive, particularly since an entire year of simulations must be generated.

As many of the Colorado RAWs sites as possible have been put into the CALMET input files. In addition, the MM4 1990 extraction domain included the entire State of Colorado plus a buffer that extends about 160 km beyond State boundaries. This was done so that the MM4 extraction file could be used for other applications in Colorado.

4.2.3.1. CALMET Performance Evaluation

The Division performed a limited evaluation of the MM4/CALMET modeling system.

The first evaluation measure was operational. It looked at the model's ability to estimate surface wind speed and direction correctly. That is, the Division evaluated whether or not the meteorological parameters generated by CALMET are reasonable, consistent, and agree adequately with available observations and conceptual models (McNally and Tesche, 1998). Sparse meteorological observations for 1990 made it difficult to assess model performance. Thus, there are significant uncertainties with respect to model performance.

[16] August 1995 Compact Disks (CDs) jointly produced by the National Climatic Data Center and the Atmospheric Sciences Modeling Division of the National Oceanic and Atmospheric Administration (NOAA)

[17] Unlike a the diagnostic model CALMET (which is good for introducing local-scale terrain effects into the meteorological field), a prognostic model like MM5 or the Colorado State University RAMS model

In addition, the Division had initially planned to conduct a scientific evaluation "to address the realism of the meteorological processes simulated by the model through testing the model as an entire system (i.e., not merely focusing on surface wind predictions) as well as its component parts. The scientific evaluation seeks to determine whether the model's behavior, in the aggregate and in its component modules, is consistent with prevailing theory, knowledge of physical processes, and observations. The main objective is to reveal the presence of bias and internal (compensating) errors in the model that, unless discovered and rectified, or at least quantified, may lead to erroneous or fundamentally incorrect decisions based on model usage. Ideally, the scientific evaluation consists of a series of diagnostic and mechanistic tests aimed at: (a) examining the existence of compensating errors; (b) determining the causes of the failure of a flawed model; (c) stressing a model to ensure failure if indeed the model is flawed; (d) provide additional insight into model performance beyond that supplied through routine, operational evaluation procedures." (McNally and Tesche, 1998) In fact, resource and time constraints prevented the Division from performing this evaluation.

Graphical displays were the primary method used to evaluate model performance. The primary focus of the evaluation was to compare wind vectors with conceptual models of the expected meteorology in the area. In particular, the Division verified that key complex terrain meteorological regimes were realistically modeled. For example, wind vectors at night and during the day were examined to determine if realistic upslope (afternoon) and downslope (night) winds were present. The Division also checked for the presence of realistic up and down valley flow regimes. In addition, outflow distances of drainage winds from canyons draining into valleys were reviewed for realism.

The lack of observations in the area made it necessary to rely almost exclusively on MM4 to provide the synoptic scale meteorological conditions.

Finally, the Division reviewed concentration estimates from the CALMET/CALPUFF modeling system with those from several ISCST3 simulations. Based on the Division's conceptual model of meteorology in the area and based on transport distances, it was expected that CALMET/CALPUFF would, in this case, produce lower concentrations estimates than ISCST3. In fact, CALMET/CALPUFF impacts in Class I areas were a factor of 2 to 3 lower than the ISCST3 estimates. This is consistent with expectations and provides some assurance that the CALMET fields are within a reasonable range.

4.2.3.2. Terrain

Gridded terrain elevations are based on 3 arc-second digital elevation models (DEMs) produced by the United States Geological Survey (USGS). Data are provided in files covering 1 degree by 1 degree blocks of latitude and longitude. The 1-degree DEMs are produced by the Defense Mapping Agency using cartographic

and photographic sources. USGS 1:250,000 scale topographic maps are the primary source of the 1-degree DEMs (Scire, Robe, Sheadel, 1997).

One degree DEM data consists of an array of 1201 by 1201 elevations referenced on the geographic (latitude/longitude) coordinate system of the World Geodetic System 1972 Datum. Elevations are in meters relative to mean sea level, and the spacing of the elevations along each profile is 3 arc-seconds, which corresponds to a spacing of approximately 90 meters (Scire, Robe, Sheadel, 1997).

A resolution of 2-km in the horizontal was selected to represent the sharp variations in terrain elevations in the area. All USGS elevation records located within a grid cell of the computational domain were averaged to produce a mean elevation at each gridpoint. A 2-km resolution produces a reasonable number of grid cells (88 x 88) but allows adequate representation of the important terrain features. Of particular importance is the resolution of the valley north of Durango, as it provides a possible channeling mechanism for pollutant transport into the Weminuche Wilderness area. A 2-km grid resolution resolves this valley and others adequately. The modeling domain has been gridded at 1-km resolution as well by Earth Tech. The large terrain features associated with the wilderness are resolved by the 2-km grid resolution. It is expected the terrain will produce important blocking effects and slope flows which may serve to deflect the trajectories of plumes in the area (Scire, Robe, Sheadel, 1997).

4.2.3.3. Land Use

USGS Land Use data in the Composite Theme Grid format (CTG) with 200 meter resolution was used.

4.2.3.4. Modeling Domain

As shown in Figure 3, stationary source inventory data from AIRS shows no significant NOx stationary sources in southeast Utah or Northeast Arizona that could realistically be included the modeling domain without making it too large (i.e., beyond the Division's computational resources). In addition, there are no cities located in southeast Utah or northwest Arizona and the population density is quite low. Consequently, it is assumed that the increment consuming NOx emissions density from these areas is negligible with respect to transport into southwest Colorado. Therefore, the modeling domain excluded Utah and Arizona. While it's possible that long range transport from large NOx sources in Arizona or Utah could affect increment in Colorado, the CALMET/CALPUFF modeling system does not allow sources outside the modeling domain to be included in the source file. If the domain were enlarged to include a much larger area, the grid cell size would have to be increased. This would degrade the analysis in Colorado. Thus, it's believed that the most credible results are obtained by focusing the domain on the primary area of NOx emissions in New Mexico and Colorado as shown in Figure 4 and maintaining a 2-kilometer grid size.

There is a group of sources in Colorado located northwest of Mesa Verde that would ideally be included in the modeling domain (see Figure 5). Once again, the Division did not expand the modeling domain because of the computational demands of making too large of a domain with 2-km grid cells. To help make this decision, the Division reviewed recent permit modeling for the 66.3 tpy Dolores Compressor Station located 34 kilometers north of Mesa Verde National Park. It showed an impact of 0.0013 $\mu g/m^3$ at the park. This is well below the Class I NO_2 increment of 2.5 $\mu g/m^3$ and well below the recommended Class 1 modeling significance level of 0.1 $\mu g/m^3$. As can be seen in Figure 4, the group of sources northwest of Mesa Verde near the Utah border have a relatively low overall emission rate (e.g., 500 tons per year) as compared to the sources east and southeast of Mesa Verde. The results from the Dolores Compressor Station suggest that the expected NOx impact from the sources northwest of Mesa Verde would be on the order of 0.01 $\mu g/m^3$. Thus, the Division excluded that group of sources from the modeling domain. It should be emphasized that the group of sources being discussed reflects ALL sources in AIRS, including baseline sources. That is, their effect on increments has not yet been determined. Thus, it's probably reasonable to assume that some or even most of these sources may actually be baseline sources that do not consume increment.

The selected modeling domain is the same as the one used in the SUIT draft EIS. As noted in the SUIT draft EIS protocol, CALMET and CALPUFF use terrain-following coordinates. The horizontal grid is uniform. The complexity of the terrain in the SUIT domain requires a fine resolution of 2-km. In the vertical, a stretched grid was used to resolve the mixed layer with a fine resolution. A somewhat coarser resolution was used aloft. Thirteen vertical layers are located at: 20, 50, 100, 200, 300, 400, 500, 600, 750, 1000, 1500, 2000, 3000 meters.

The CALMET computational domain is located in southwestern Colorado and northwestern New Mexico. It includes Mesa Verde National Park and the Weminuche Wilderness area and extends in Colorado from about Cortez to Pagosa Springs. The domain extends 176 km x 176 km in the longitudinal and meridonal directions, respectively. There are major topographical features in the area that affect wind flow, including peak elevations over 4000 meters, which are more than 2000 meters above the base elevation of some of the proposed sources (Scire, Robe, Sheadel, 1997).

Table 6. CALMET grid control parameters.

```
HORIZONTAL GRID DEFINITION:

          No. X grid cells (NX)      No default     ! NX =   88  !

          No. Y grid cells (NY)      No default     ! NY =   88  !

     GRID SPACING (DGRIDKM)           No default     ! DGRIDKM = 2. !

                                      Units: km

REFERENCE COORDINATES

     of SOUTHWEST corner of grid cell (1,1)

        X coordinate (XORIGKM)        No default     ! XORIGKM = 180.000 !

        Y coordinate (YORIGKM)        No default     ! YORIGKM = 4021.000 !

                                      Units: km

        Latitude  (XLAT0)             No default     ! XLAT0 = 36.280 !

        Longitude (XLON0)             No default     ! XLON0 = 108.560 !

     UTM ZONE (IUTMZN)                Default: 0     ! IUTMZN =  13  !

LAMBERT CONFORMAL PARAMETERS

     Rotate input winds from true north to map north using a Lambert conformal

     projection? (LLCONF)             Default: F     ! LLCONF = F !

     Latitude of 1st standard parallel   Default: 30.   ! XLAT1 = 30.000 !

     Latitude of 2nd standard parallel   Default: 60.   ! XLAT2 = 60.000 !

     (XLAT1 and XLAT2; + in NH, - in SH)

        Longitude (RLON0)               Default = 90.  ! RLON0 = 108.000 !

     Origin Latitude (RLAT0)          Default = 40.  ! RLAT0 = 38.000 !

Vertical grid definition:

        No. of vertical layers (NZ)    No default     ! NZ =  13  !

        Cell face heights in arbitrary

        vertical grid (ZFACE(NZ+1))    No defaults

                                       Units: m

        ! ZFACE = 0.,20.,50.,100.,200.,300.,400.,500.,600.,750.,1000.,1500.,2000.,3000. !
```

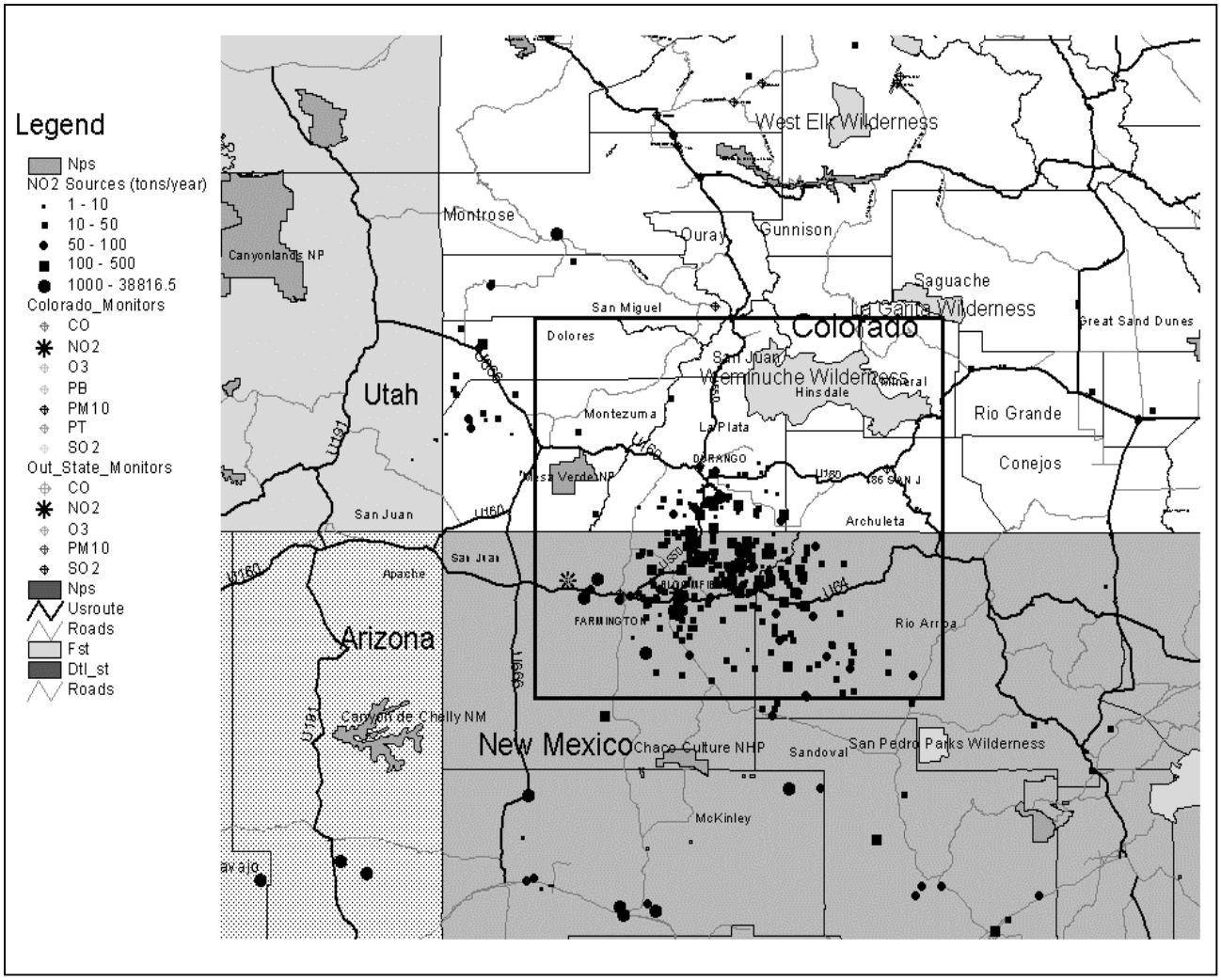


Figure 8. Approximate modeling domain (box) with NOx point sources and monitor station locations.

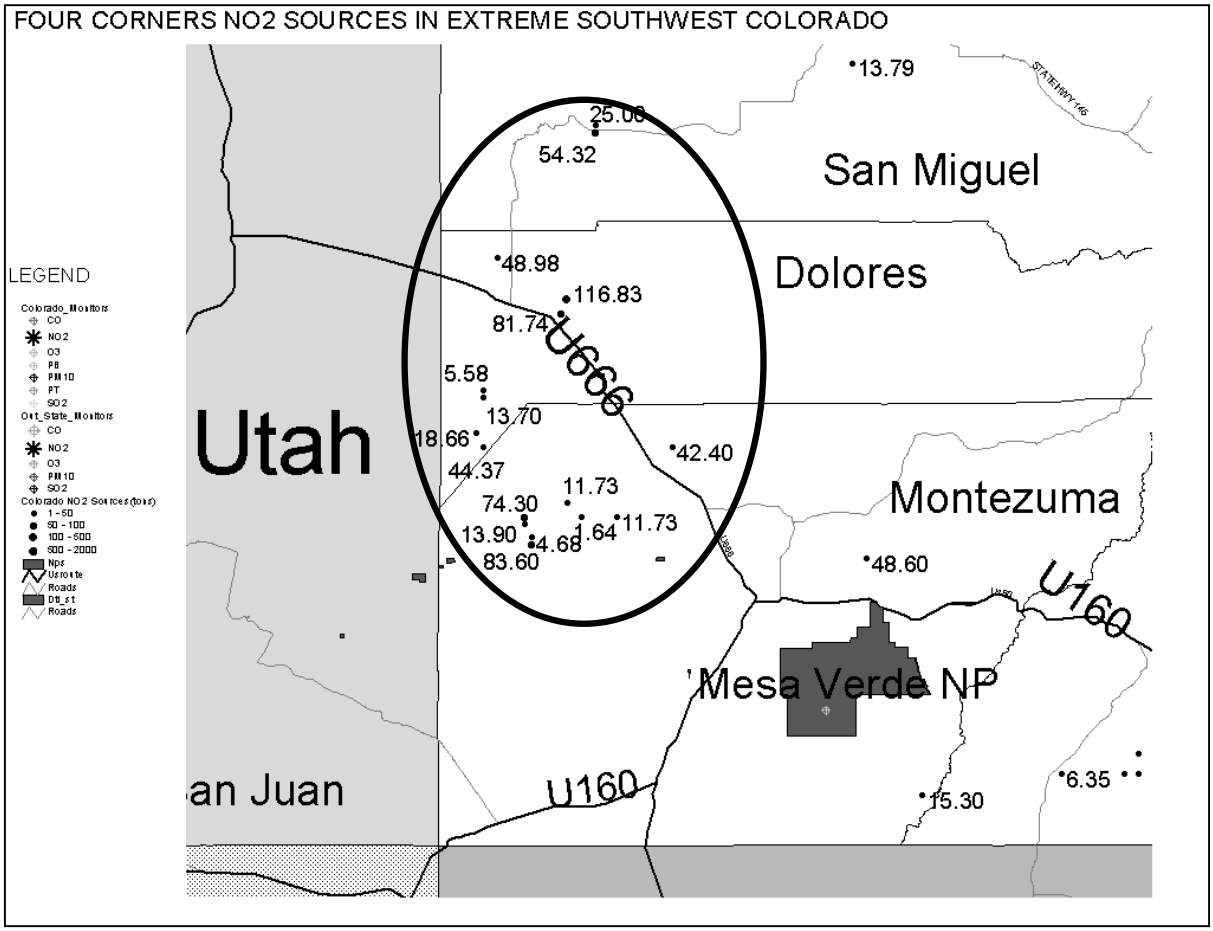


Figure 9. The oval highlights stationary NOx sources northeast of Mesa Verde that have been excluded from the modeling domain. This decision has been made due to computational and resource constraints.

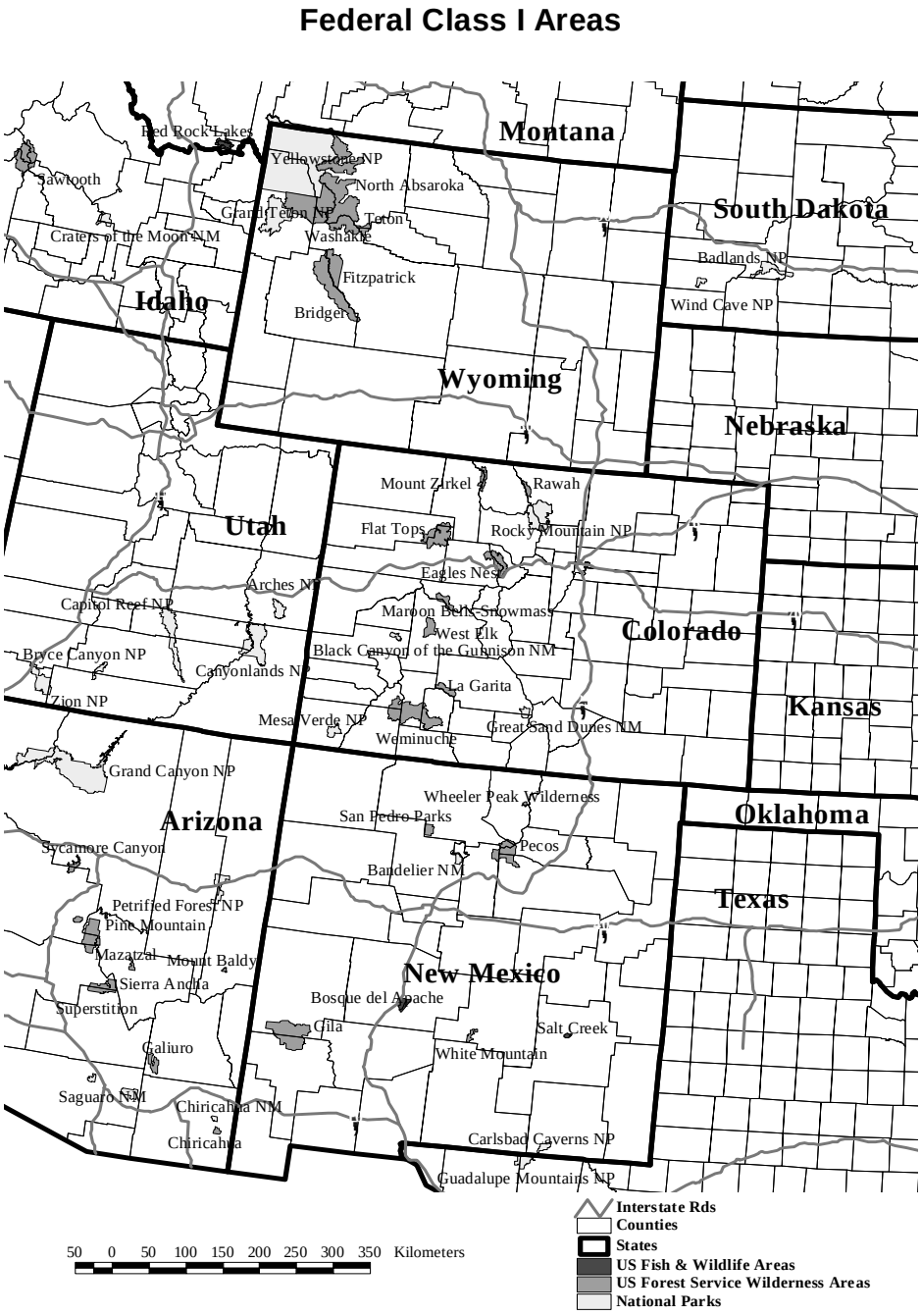


Figure 10. Federal Class I areas. The modeling domain includes Mesa Verde National Monument and the Weminuche Wilderness Area.

4.2.3.5. Meteorological Model Options

In developing the Step 1 wind field, CALMET adjusts the initial guess field to reflect kinematic effects of the terrain, slope flows, and blocking effects. Slope flows are a function of the local slope and altitude of the nearest crest. The crest is defined as the highest peak within a radius of TERRAD around each grid point. The value of TERRAD is based on an analysis of the scale of the terrain. The Step 1 field produces a flow field consistent with the fine-scale CALMET terrain resolutions (2 km). (Scire, Robe, Sheadel, 1997). TERRAD was set to 15.

In Step 2, observations are incorporated into the Step 1 wind field to produce a final wind field. Each observation site influences the final wind field within a radius of influence (parameters RMAX1 at the surface and RMAX2 aloft). Observations and Step 1 fields are weighted by means of parameters R1 at the surface and R2 aloft: at a distance R1 from an observation site, the Step 1 wind field and the surface observations are weighted equally. In complex terrain, channeling (blocking effects) and slope flows contribute significantly to the wind field. Therefore, relatively small values of R1 and R2 are used to produce a large weight of the Step 1 field. (Scire, Robe, Sheadel, 1997)

An R1 of 10 and R2 of 25 were used. In fact, few observations were present in the domain. The wind field is primarily a product of the MM4 initial guess fields and CALMET's complex terrain algorithms.

Since virtually all the observations are included in the initial guess field, RMAX1 is set to 10, RMAX2 is set to 50, and RMIN is set to 1.0 km. This gives an appropriate weight to the Step 1 field since there are strong terrain influences on the flow fields in this area.

4.2.3.6. Meteorological Observations

National Weather Service (NWS) upper-air measurements from Albuquerque and Grand Junction have been used in CALMET.

Surface site measurements were obtained from RAWs sites in Colorado and from NWS sites in Gallup, Alamosa, Grand Junction, and Albuquerque.

After reviewing surface data from several sources, little observational data for 1990 was found. Thus, the CALMET modeling relies heavily on the MM4 meteorological fields for synoptic-scale fields.

Data from the Colorado State University and the Colorado Climate Center network of meteorological towers in agricultural areas along the western edge of the modeling domain were reviewed. While these sites do not necessarily meet PSD monitoring guidelines, the data are nevertheless useful and a valuable source of site-specific information. Figure 8 shows the CoAgMet sites in Colorado. Sites dvc01, yjk01, ctz01, and ctr01 are near the study area. Unfortunately, data for 1990

are not available. Nevertheless, the sites are useful for understanding local wind regimes.

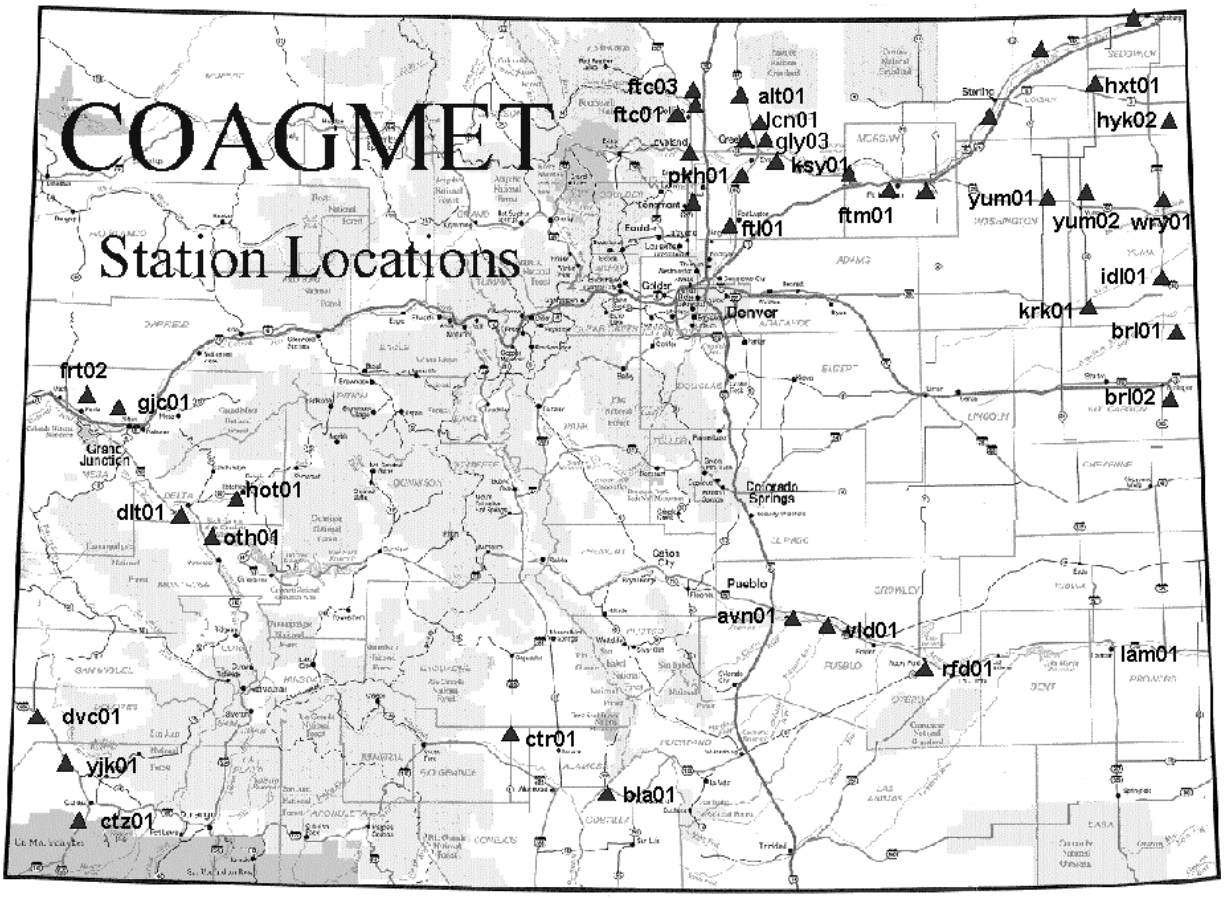


Figure 11. CoAgMet meteorological sites in Colorado. [image courtesy of Colorado Climate Center]

Remote Automatic Weather Stations (RAWS) are maintained by Federal and State agencies. The sites (shown in the next figure) provide a good data source in remote areas. As with the CoAgMet sites, the data quality is not PSD. Nevertheless, the data are useful to help provide a conceptual understanding of meteorology in the study area. Some of the RAWS sites were in existence in 1990 and were used in the CALMET modeling, even though most of the sites are outside the CALPUFF domain.

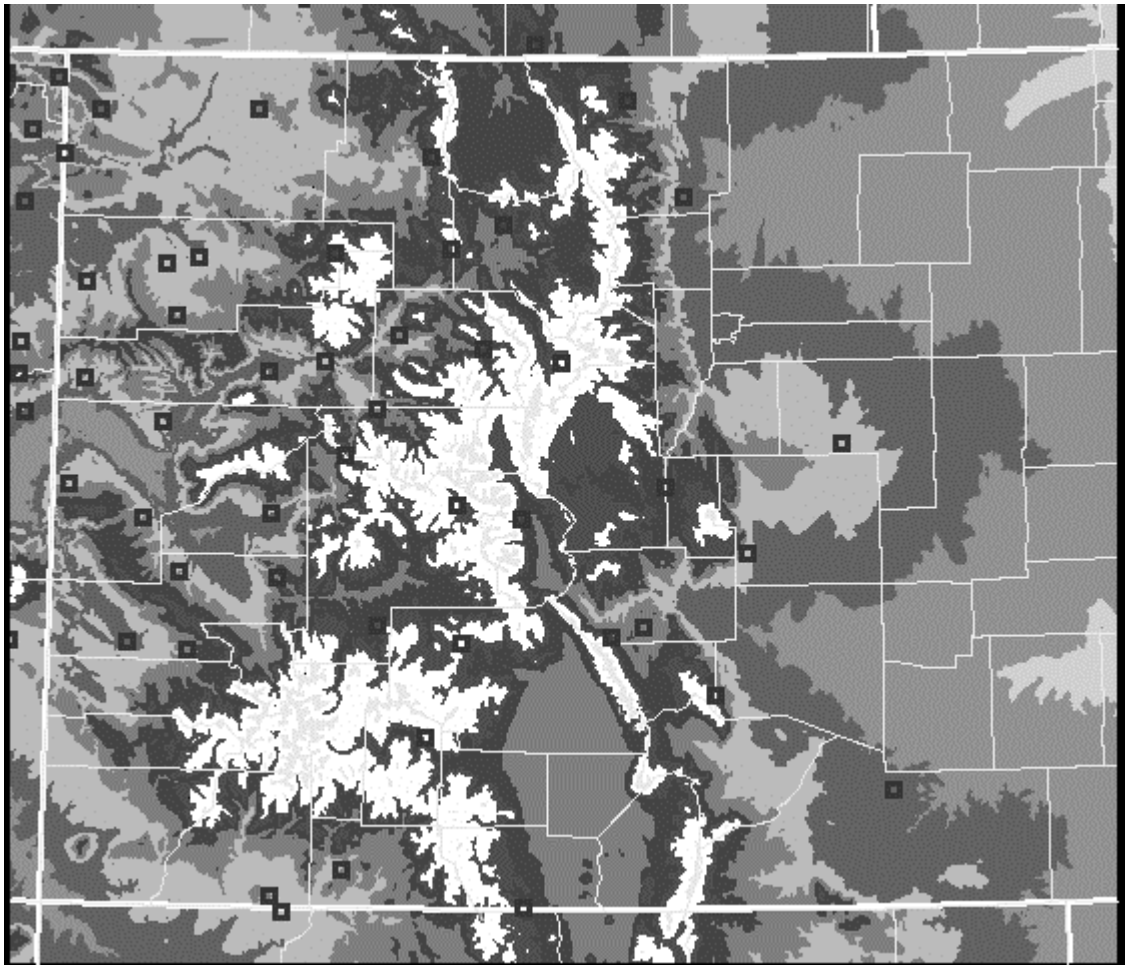


Figure 12. Remote Automatic Weather Station (RAWS) data for Colorado. RAWS are indicated by the dark squares. (image courtesy of National Weather Service Forecast Office - Boise, Idaho: http://www.boi.noaa.gov/FWXEXP/RAWS/Pages/comap.html)

Table 7. CALMET parameters.

```
INPUT GROUP: 5 -- Wind Field Options and Parameters
--------------


    WIND FIELD MODEL OPTIONS
       Model selection variable (IWFCOD)     Default: 1      ! IWFCOD =  1  !
          0 = Objective analysis only
          1 = Diagnostic wind module

       Compute Froude number adjustment
       effects ? (IFRADJ)                    Default: 1      ! IFRADJ =  1  !
       (0 = NO, 1 = YES)

       Compute kinematic effects ? (IKINE)   Default: 0      ! IKINE  =  1  !
       (0 = NO, 1 = YES)

       Use O'Brien procedure for adjustment
       of the vertical velocity ? (IOBR)     Default: 0      ! IOBR =  0  !
       (0 = NO, 1 = YES)

       Compute slope flow effects ? (ISLOPE) Default: 1      ! ISLOPE  =  1  !
       (0 = NO, 1 = YES)

       Extrapolate surface wind observations
       to upper layers ? (IEXTRP)            Default: -4     ! IEXTRP = -4  !
       (1 = no extrapolation is done,
        2 = power law extrapolation used,
        3 = user input multiplicative factors
            for layers 2 - NZ used (see FEXTRP array)
        4 = similarity theory used
        -1, -2, -3, -4 = same as above except layer 1 data
            at upper air stations are ignored

       Extrapolate surface winds even
       if calm? (ICALM)                      Default: 0      ! ICALM  =  0  !
       (0 = NO, 1 = YES)

       Layer-dependent biases modifying the weights of
       surface and upper air stations (BIAS(NZ))
         -1<=BIAS<=1
       Negative BIAS reduces the weight of upper air stations
         (e.g. BIAS=-0.1 reduces the weight of upper air stations
       by 10%; BIAS= -1, reduces their weight by 100 %)
       Positive BIAS reduces the weight of surface stations
         (e.g. BIAS= 0.2 reduces the weight of surface stations
       by 20%; BIAS=1 reduces their weight by 100%)
       Zero BIAS leaves weights unchanged (1/R**2 interpolation)
       Default: NZ*0
                                ! BIAS = -1 , -1 , -1 , -.75 , -.5 ,  .25 ,  1 ,  1 ,  1 ,
1 ,  1 ,  1 ,  1  !

       Minimum distance from nearest upper air station
       to surface station for which extrapolation
       of surface winds at surface station will be allowed
       (RMIN2: Set to -1 for IEXTRP = 4 or other situations
        where all surface stations should be extrapolated)
                                              Default: 4.    ! RMIN2 = -1.0 !

       Use gridded prognostic wind field model
       output fields as input to the diagnostic
       wind field model (IPROG)              Default: 0      ! IPROG =  4  !
       (0 = No, [IWFCOD = 0 or 1]
        1 = Yes, use CSUMM prog. winds as Step 1 field, [IWFCOD = 0]
```

```
       2 = Yes, use CSUMM prog. winds as initial guess field [IWFCOD = 1]
       3 = Yes, usr MM4 prog. winds as Step 1 field [IWFCOD = 0]
       4 = Yes, use MM4 prog. winds as initial guess field [IWFCOD = 1]
       5 = Yes, use MM4 prog. winds as observations [IWFCOD = 1]

   RADIUS OF INFLUENCE PARAMETERS

      Use varying radius of influence       Default: F      ! LVARY =  T!
      (if no stations are found within RMAX1,RMAX2,
       or RMAX3, then the closest station will be used)

      Maximum radius of influence over land
      in the surface layer (RMAX1)          No default      ! RMAX1 = 10. !
                                            Units: km
      Maximum radius of influence over land
      aloft (RMAX2)                         No default      ! RMAX2 = 50. !
                                            Units: km
      Maximum radius of influence over water
      (RMAX3)                               No default      ! RMAX3 = 500. !
                                            Units: km


   OTHER WIND FIELD INPUT PARAMETERS

      Minimum radius of influence used in
      the wind field interpolation (RMIN)   Default: 0.1    ! RMIN = 1. !
                                            Units: km
      Radius of influence of terrain
      features (TERRAD)                     No default      ! TERRAD = 15. !

                                            Units: km
      Relative weighting of the first
      guess field and observations in the
      SURFACE layer (R1)                    No default      ! R1 = 10. !
      (R1 is the distance from an           Units: km
      observational station at which the
      observation and first guess field are
      equally weighted)

      Relative weighting of the first
      guess field and observations in the
      layers ALOFT (R2)                     No default      ! R2 = 25. !
      (R2 is applied in the upper layers    Units: km
      in the same manner as R1 is used in
      the surface layer).

      Relative weighting parameter of the
      prognostic wind field data (RPROG)    No default      ! RPROG = 0. !
      (Used only if IPROG = 1)              Units: km
      ------------------------

      Maximum acceptable divergence in the
      divergence minimization procedure
      (DIVLIM)                              Default: 5.E-6  ! DIVLIM= 5.0E-06 !

      Maximum number of iterations in the
      divergence min. procedure (NITER)     Default: 50     ! NITER =  50  !

      Number of passes in the smoothing
      procedure (NSMTH(NZ))
      NOTE: NZ values must be entered
           Default: 2,(mxnz-1)*4 ! NSMTH =
2 ,  4 ,  4 ,  4 ,  4 ,  4 ,  4 ,  4 ,  4 ,  4 ,  4 ,  4 ,  4  !

      Maximum number of stations used in
      each layer for the interpolation of
      data to a grid point (NINTR2(NZ))
```

```
      NOTE: NZ values must be entered       Default: 99.    ! NINTR2 =
3 ,  3 ,  3 ,  3 ,  3 ,  3 ,  3 ,  3 ,  3 ,  3 ,  3 ,  3 ,  3  !

      Critical Froude number (CRITFN)       Default: 1.0    ! CRITFN = 1. !

      Empirical factor controlling the
      influence of kinematic effects
      (ALPHA)                               Default: 0.1    ! ALPHA = 0.1 !

      Multiplicative scaling factor for
      extrapolation of surface observations
      to upper layers (FEXTR2(NZ))          Default: NZ*0.0
      ! FEXTR2 = 0., 0., 0., 0., 0., 0., 0., 0., 0., 0., 0., 0., 0. !
      (Used only if IEXTRP = 3 or -3)


   BARRIER INFORMATION

      Number of barriers to interpolation
      of the wind fields (NBAR)             Default: 0      ! NBAR =  0  !

      THE FOLLOWING 4 VARIABLES ARE INCLUDED
      ONLY IF NBAR > 0
      NOTE: NBAR values must be entered     No defaults
            for each variable               Units: km

         X coordinate of BEGINNING
         of each barrier (XBBAR(NBAR))      ! XBBAR = 0. !
         Y coordinate of BEGINNING
         of each barrier (YBBAR(NBAR))      ! YBBAR = 0. !

         X coordinate of ENDING
         of each barrier (XEBAR(NBAR))      ! XEBAR = 0. !
         Y coordinate of ENDING
         of each barrier (YEBAR(NBAR))      ! YEBAR = 0. !


   DIAGNOSTIC MODULE DATA INPUT OPTIONS

      Surface temperature (IDIOPT1)         Default: 0      ! IDIOPT1 =  0  !
         0 = Compute internally from
             hourly surface observations
         1 = Read preprocessed values from
             a data file (DIAG.DAT)

         Surface met. station to use for
         the surface temperature (ISURFT)   No default     ! ISURFT =  1  !
         (Must be a value from 1 to NSSTA)
         (Used only if IDIOPT1 = 0)
         --------------------------

      Domain-averaged temperature lapse
      rate (IDIOPT2)                        Default: 0      ! IDIOPT2 =  0  !
         0 = Compute internally from
             twice-daily upper air observations
         1 = Read hourly preprocessed values
             from a data file (DIAG.DAT)

         Upper air station to use for
         the domain-scale lapse rate (IUPT) No default     ! IUPT   =  1  !
         (Must be a value from 1 to NUSTA)
         (Used only if IDIOPT2 = 0)
         --------------------------

         Depth through which the domain-scale
         lapse rate is computed (ZUPT)      Default: 200.  ! ZUPT = 200. !
         (Used only if IDIOPT2 = 0)         Units: meters
```

```
   -------------------------

Domain-averaged wind components
(IDIOPT3)                          Default: 0     ! IDIOPT3 =  0  !
   0 = Compute internally from
       twice-daily upper air observations
   1 = Read hourly preprocessed values
       a data file (DIAG.DAT)

   Upper air station to use for
   the domain-scale winds (IUPWND)    Default: -1    ! IUPWND = -1  !
   (Must be a value from -1 to NUSTA)
   (Used only if IDIOPT3 = 0)
   -------------------------

   Bottom and top of layer through
   which the domain-scale winds
   are computed
   (ZUPWND(1), ZUPWND(2))        Defaults: 1., 1000. ! ZUPWND= 1., 1500. !
   (Used only if IDIOPT3 = 0)    Units: meters
   -------------------------

Observed surface wind components
for wind field module (IDIOPT4)  Default: 0     ! IDIOPT4 =  0  !
   0 = Read WS, WD from a surface
       data file (SURF.DAT)
   1 = Read hourly preprocessed U, V from
       a data file (DIAG.DAT)

Observed upper air wind components
for wind field module (IDIOPT5)  Default: 0     ! IDIOPT5 =  0  !
   0 = Read WS, WD from an upper
       air data file (UP1.DAT, UP2.DAT, etc.)
   1 = Read hourly preprocessed U, V from
       a data file (DIAG.DAT)

LAKE BREEZE INFORMATION

   Use Lake Breeze Module  (LLBREZE)
                                   Default: F      ! LLBREZE = F !

    Number of lake breeze regions (NBOX)           ! NBOX =  0  !

 X Grid line 1 defining the region of interest
                                                   ! XG1 = 0. !
 X Grid line 2 defining the region of interest
                                                   ! XG2 = 0. !
 Y Grid line 1 defining the region of interest
                                                   ! YG1 = 0. !
 Y Grid line 2 defining the region of interest
                                                   ! YG2 = 0. !

  X Point defining the coastline (Straight line)
            (XBCST)  (KM)   Default: none    ! XBCST = 0. !

  Y Point defining the coastline (Straight line)
            (YBCST)  (KM)   Default: none    ! YBCST = 0. !

  X Point defining the coastline (Straight line)
            (XECST)  (KM)   Default: none    ! XECST = 0. !

  Y Point defining the coastline (Straight line)
            (YECST)  (KM)   Default: none    ! YECST = 0. !


Number of stations in the region     Default: none ! NLB = *1 !*
(Surface stations + upper air stations)
```

```
      Station ID's  in the region   (METBXID(NLB))
      (Surface stations first, then upper air stations)
        ! METBXID = *0 !*

!END!

--------------------------------------------------------------------------------

INPUT GROUP: 6 -- Mixing Height, Temperature and Precipitation Parameters
--------------

   EMPIRICAL MIXING HEIGHT CONSTANTS

      Neutral, mechanical equation
      (CONSTB)                          Default: 1.41   ! CONSTB = 1.41 !
      Convective mixing ht. equation
      (CONSTE)                          Default: 0.15   ! CONSTE = 0.15 !
      Stable mixing ht. equation
      (CONSTN)                          Default: 2400.  ! CONSTN = 2400.!
      Overwater mixing ht. equation
      (CONSTW)                          Default: 0.16   ! CONSTW = 0.16 !
      Absolute value of Coriolis
      parameter (FCORIOL)               Default: 1.E-4  ! FCORIOL = 1.0E-04!
                                        Units: (1/s)

   SPATIAL AVERAGING OF MIXING HEIGHTS

      Conduct spatial averaging
      (IAVEZI)  (0=no, 1=yes)           Default: 1      ! IAVEZI =  1  !

      Max. search radius in averaging
      process (MNMDAV)                  Default: 1      ! MNMDAV =  1  !
                                        Units: Grid
                                               cells
      Half-angle of upwind looking cone
      for averaging (HAFANG)            Default: 30.    ! HAFANG = 30. !
                                        Units: deg.
      Layer of winds used in upwind
      averaging (ILEVZI)                Default: 1      ! ILEVZI =  6  !
      (must be between 1 and NZ)

   OTHER MIXING HEIGHT VARIABLES

      Minimum potential temperature lapse
      rate in the stable layer above the
      current convective mixing ht.     Default: 0.001  ! DPTMIN = 0.001 !
      (DPTMIN)                          Units: deg. K/m
      Depth of layer above current conv.
      mixing height through which lapse Default: 200.   ! DZZI = 200. !
      rate is computed (DZZI)           Units: meters

      Minimum overland mixing height    Default:  50.   ! ZIMIN = 20. !
      (ZIMIN)                           Units: meters
      Maximum overland mixing height    Default: 3000.  ! ZIMAX = 3000. !
      (ZIMAX)                           Units: meters
      Minimum overwater mixing height   Default:   50.  ! ZIMINW = 100. !
      (ZIMINW) -- (Not used if observed Units: meters
      overwater mixing hts. are used)
      Maximum overwater mixing height   Default: 3000.  ! ZIMAXW = 3000. !
      (ZIMAXW) -- (Not used if observed Units: meters
      overwater mixing hts. are used)


   TEMPERATURE PARAMETERS

      Interpolation type
```

```
      (1 = 1/R ; 2 = 1/R**2)                Default:1         ! IRAD =  1  !

      Radius of influence for temperature
      interpolation (TRADKM)                Default: 500.     ! TRADKM = 100. !
                                            Units: km

      Maximum Number of stations to include
      in temperature interpolation (NUMTS)  Default: 5        ! NUMTS = 5  !

      Conduct spatial averaging of temp-
      eratures (IAVET)  (0=no, 1=yes)         Default: 1     ! IAVET =  1  !
      (will use mixing ht MNMDAV,HAFANG
       so make sure they are correct)

      Default temperature gradient        Default: -.0098 ! TGDEFB = -0.0098 !
      below the mixing height over
      water (K/m) (TGDEFB)

      Default temperature gradient        Default: -.0045 ! TGDEFA = -0.0035 !
      above the mixing height over
      water (K/m) (TGDEFA)

      Beginning (JWAT1) and ending (JWAT2)
      land use categories for temperature                   ! JWAT1 =  55  !
      interpolation over water -- Make                      ! JWAT2 =  55  !
      bigger than largest land use to disable

   PRECIP INTERPOLATION PARAMETERS

      Method of interpolation (NFLAGP)      Default = 2    ! NFLAGP =  3  !
       (1=1/R,2=1/R**2,3=EXP/R**2)
      Radius of Influence (km) (SIGMAP)     Default = 100.0  ! SIGMAP = 100. !
       (0.0 => use half dist. btwn
        nearest stns w & w/out
        precip when NFLAGP = 3)
      Minimum Precip. Rate Cutoff (mm/hr)   Default = 0.01  ! CUTP = 0.01 !
       (values < CUTP = 0.0 mm/hr)
```

4.2.4. CALPUFF-based Cumulative Impact Analysis

Since negative emission rates (e.g., increment expansion) can't be used in CALPUFF[18], "baseline year" and "current year," increment expansion was not modeled In fact, it was not needed to show compliance with increments.

Two important computational parameters in CALPUFF are XMXLEN (maximum length of an emitted puff, in grid units) and XSAMLEN (maximum travel distance of a puff in grid units, during one time step). Both of these variables were set to 1.0 in the CALPUFF simulations in order to allow the strong wind channeling effects to be accounted for in the puff trajectory calculations. The first parameter ensures that the length of an emitted puff does not become so large so that it cannot response to changes in the wind field on the scale of the meteorological grid (2 km resolution). The model automatically increases the frequency of puff releases to ensure the length of a single puff is not larger than the grid size. The second parameter decreases the internal time step to ensure the travel distance during one time step does not exceed the grid size (Scire, Robe, Sheadel, 1997).

4.2.4.1. Selection of Dispersion Coefficients

Pasquill-Gifford (PG) dispersion coefficients were used. CALPUFF provides the option to use turbulence measurements (sigma-v and sigma-w), similarity theory to estimate sigma-v and sigma-w from modeled surface heat and momentum fluxes, McElroy-Pooler (MP) dispersion coefficients, or equations based on the Complex Terrain Dispersion Model (CTDM). Options are also available to apply an averaging time correction or surface roughness length adjustments to the PG coefficients (Scire, Robe, Sheadel, 1997).

4.2.4.2. Building Downwash

Huber-Synder and Schulman-Scire downwash algorithms are available in CALPUFF. Building downwash was not used in CALPUFF since it was applied only for long-range transport.

4.2.4.3. Conversion of NO to NO_2

The chemistry modules in CALPUFF were not used. The NO to NO_2 conversion scheme in the latest version of CALPUFF was considered but not used. It is based on the National Park Service's ARM3 model (RIVAD scheme). Instead of five species, CALPUFF deals with six (SO_2, SO_4, NO, NO_2, HNO_3, and NO_3). The conversion of NO to NO_2 is treated explicitly. The Division decided instead to initially perform upper bound NOx modeling with no chemistry or deposition. Since compliance with Class I increments was demonstrated with a 100 percent conversion rate, additional modeling with chemistry was not performed.

[18] According to the model developer, negative emission rates in CALPUFF cause problems for the data packing scheme and also for the chemistry. The data packing scheme uses a negative integer code as a flag for a repetition factor.

4.2.4.4. Treatment of Terrain

Several terrain adjustment schemes are available in CALPUFF to account for interactions between the plume and terrain.

Three types of terrain adjustment are available in CALPUFF. Two are incorporated in the existing plume models: the original ISC terrain adjustment, and the plume path coefficient adjustment (e.g., the half-height or partial height adjustments found in plume models such as COMPLEX I, RTDM, and ISC3. The third treatment and newer option is consistent with the concepts about the effects of strain in the flow on puff growth that lie behind the CTSG treatment, but employs sufficient simplifications that it is readily applied to the gridded terrain fields from CALMET (Scire, Strimaitis, Yamartino, 1999).

The partial plume path adjustment method (MCTADJ = 3) was used since it is recommended for all Class I permit modeling in Colorado. This decision is based on recommendations from the National Park Service based on work done during Project MOHAVE, where CALPUFF results matched measured tracer concentrations fairly well with the partial plume path adjustment method. Without this option, the model significantly underestimated the measured tracer concentrations. (The tracer monitors were in complex terrain several hundred meters above the release point.)

4.2.4.5. Receptor Network

The initial receptor field had receptors centered on each grid cell from the meteorological model, CALMET. That is, receptors were placed at 2-kilometer spacing. There are no NOx point sources sufficiently close to the Class I receptors to require finer receptor spacing. Due to the fact that CALPUFF run-times were extremely long due to the large number of point sources in the inventory, the Division ended up restricting receptors to Class I areas only. Computational times on a 450 Mhz computer still took over 12 days of CPU time.

4.2.4.6. Meteorology

The CALPUFF meteorological file is based on the MM4/CALMET models. Refer to the CALMET section of the protocol for details.

4.2.4.7. Modeling Domain

The CALPUFF modeling domain is identical to the CALMET modeling domain. Refer to the CALMET section for details.

Table 8. CALPUFF parameters.

```
INPUT GROUP: 2 -- Technical options
--------------


     Vertical distribution used in the
     near field (MGAUSS)                  Default: 1     ! MGAUSS =  1   !
        0 = uniform
        1 = Gaussian

     Terrain adjustment method
     (MCTADJ)                             Default: 3     ! MCTADJ =  3   !
        0 = no adjustment
        1 = ISC-type of terrain adjustment
        2 = simple, CALPUFF-type of terrain
            adjustment
        3 = partial plume path adjustment

     Subgrid-scale complex terrain
     flag (MCTSG)                         Default: 0     ! MCTSG =  0   !
        0 = not modeled
        1 = modeled

     Near-field puffs modeled as
     elongated 0 (MSLUG)                  Default: 0     ! MSLUG =  0   !
        0 = no
        1 = yes (slug model used)

     Transitional plume rise modeled ?
     (MTRANS)                             Default: 1     ! MTRANS =  0   !
        0 = no  (i.e., final rise only)
        1 = yes (i.e., transitional rise computed)

     Stack tip downwash? (MTIP)           Default: 1     ! MTIP =  1  !
        0 = no  (i.e., no stack tip downwash)
        1 = yes (i.e., use stack tip downwash)

     Vertical wind shear modeled above
     stack top? (MSHEAR)                  Default: 0     ! MSHEAR =  0  !
        0 = no  (i.e., vertical wind shear not modeled)
        1 = yes (i.e., vertical wind shear modeled)

     Puff splitting allowed? (MSPLIT)     Default: 0     ! MSPLIT =  0  !
        0 = no (i.e., puffs not split)
        1 = yes (i.e., puffs are split)

     Chemical mechanism flag (MCHEM)      Default: 1     ! MCHEM =  0   !
        0 = chemical transformation not
            modeled
        1 = transformation rates computed
            internally (MESOPUFF II scheme)
        2 = user-specified transformation
            rates used
        3 = transformation rates computed
            internally (RIVAD/ARM3 scheme)

     Wet removal modeled ? (MWET)         Default: 1     ! MWET =  0   !
        0 = no
        1 = yes

     Dry deposition modeled ? (MDRY)      Default: 1     ! MDRY =  0   !
        0 = no
        1 = yes
        (dry deposition method specified
```

```
         for each species in Input Group 3)

     Method used to compute dispersion
     coefficients (MDISP)                Default: 3     ! MDISP =  3   !

        1 = dispersion coefficients computed from measured values
            of turbulence, sigma v, sigma w
        2 = dispersion coefficients from internally calculated
            sigma v, sigma w using micrometeorological variables
            (u*, w*, L, etc.)
        3 = PG dispersion coefficients for RURAL areas (computed using
            the ISCST multi-segment approximation) and MP coefficients in
            urban areas
        4 = same as 3 except PG coefficients computed using
            the MESOPUFF II eqns.
        5 = CTDM sigmas used for stable and neutral conditions.
            For unstable conditions, sigmas are computed as in
            MDISP = 3, described above.  MDISP = 5 assumes that
            measured values are read

     Sigma-v/sigma-theta, sigma-w measurements used? (MTURBVW)
     (Used only if MDISP = 1 or 5)       Default: 3     ! MTURBVW =  0  !
        1 = use sigma-v or sigma-theta measurements
            from PROFILE.DAT to compute sigma-y
            (valid for METFM = 1, 2, 3, 4)
        2 = use sigma-w measurements
            from PROFILE.DAT to compute sigma-z
            (valid for METFM = 1, 2, 3, 4)
        3 = use both sigma-(v/theta) and sigma-w
            from PROFILE.DAT to compute sigma-y and sigma-z
            (valid for METFM = 1, 2, 3, 4)
        4 = use sigma-theta measurements
            from PLMMET.DAT to compute sigma-y
            (valid only if METFM = 3)

     Back-up method used to compute dispersion
     when measured turbulence data are
     missing (MDISP2)                    Default: 3     ! MDISP2 =  4  !
     (used only if MDISP = 1 or 5)
        2 = dispersion coefficients from internally calculated
            sigma v, sigma w using micrometeorological variables
            (u*, w*, L, etc.)
        3 = PG dispersion coefficients for RURAL areas (computed using
            the ISCST multi-segment approximation) and MP coefficients in
            urban areas
        4 = same as 3 except PG coefficients computed using
            the MESOPUFF II eqns.

     PG sigma-y,z adj. for roughness?    Default: 0     ! MROUGH =  0  !
     (MROUGH)
        0 = no
        1 = yes

     Partial plume penetration of        Default: 1     ! MPARTL =  0  !
     elevated inversion?
     (MPARTL)
        0 = no
        1 = yes

     Strength of temperature inversion   Default: 0     ! MTINV =  0  !
     provided in PROFILE.DAT extended records?
     (MTINV)
        0 = no (computed from measured/default gradients)
        1 = yes

     PDF used for dispersion under convective conditions?
                                         Default: 0     ! MPDF =  0  !
```

```
     (MPDF)
        0 = no
        1 = yes

     Sub-Grid TIBL module used for shore line?
                                          Default: 0     ! MSGTIBL = 0  !
     (MSGTIBL)
        0 = no
        1 = yes

     Test options specified to see if
     they conform to regulatory
     values? (MREG)                       Default: 1     ! MREG =  0   !

        0 = NO checks are made
        1 = Technical options must conform to USEPA values
                       METFM    1
                       AVET     60. (s)
                       MGAUSS   1
                       MCTADJ   3
                       MTRANS   1
                       MTIP     1
                       MCHEM    1 (if modeling SOx, NOx)
                       MWET     1
                       MDRY     1
                       MDISP    3
                       MROUGH   0
                       MPARTL   1
                       SYTDEP   550. (m)
                       MHFTSZ   0


!END!


------------------------------------------------------------------------------

INPUT GROUP: 3a, 3b -- Species list
-------------------

------------
Subgroup (3a)
------------

  The following species are modeled:

! CSPEC =          NOX !         !END!

                                                      Dry                OUTPUT GROUP
    SPECIES          MODELED          EMITTED       DEPOSITED               NUMBER
     NAME         (0=NO, 1=YES)    (0=NO, 1=YES)    (0=NO,                (0=NONE,
   (Limit: 12                                        1=COMPUTED-GAS        1=1st CGRUP,
    Characters                                       2=COMPUTED-PARTICLE   2=2nd CGRUP,
    in length)                                       3=USER-SPECIFIED)     3= etc.)

!          NOX  =         1,               1,           0,                 0   !

!END!

-------------
Subgroup (3b)
-------------
  The following names are used for Species-Groups in which results
  for certain species are combined (added) prior to output.  The
  CGRUP name will be used as the species name in output files.
  Use this feature to model specific particle-size distributions
  by treating each size-range as a separate species.
```

```
  Order must be consistent with 3(a) above.


------------------------------------------------------------------------------


INPUT GROUP: 4 -- Grid control parameters
--------------


METEOROLOGICAL grid:

            No. X grid cells (NX)      No default     ! NX =  88   !
            No. Y grid cells (NY)      No default     ! NY =  88   !
         No. vertical layers (NZ)      No default     ! NZ =  13   !

           Grid spacing (DGRIDKM)      No default     ! DGRIDKM = 2. !
                                       Units: km

                Cell face heights
                    (ZFACE(nz+1))      No defaults
                                       Units: m
   ! ZFACE = 0., 20., 50., 100., 200., 300., 400., 500., 600., 750.,
              1000., 1500., 2000., 3000. !

            Reference Coordinates
           of SOUTHWEST corner of
                grid cell(1, 1):

            X coordinate (XORIGKM)     No default     ! XORIGKM = 180. !
            Y coordinate (YORIGKM)     No default     ! YORIGKM = 4021. !
                                      Units: km

                 UTM zone (IUTMZN)     No default     ! IUTMZN =  13   !

   Reference coordinates of CENTER
        of the domain (used in the
    calculation of solar elevation
                           angles)

            Latitude  (deg.) (XLAT)    No default     ! XLAT  = 37.  !
           Longitude (deg.) (XLONG)    No default     ! XLONG = 107.  !
             Time zone        (XTZ)    No default     ! XTZ   = 7.0  !
       (PST=8, MST=7, CST=6, EST=5)



Computational grid:

     The computational grid is identical to or a subset of the MET. grid.
     The lower left (LL) corner of the computational grid is at grid point
     (IBCOMP, JBCOMP) of the MET. grid.  The upper right (UR) corner of the
     computational grid is at grid point (IECOMP, JECOMP) of the MET. grid.
     The grid spacing of the computational grid is the same as the MET. grid.

        X index of LL corner (IBCOMP)      No default     ! IBCOMP =  1   !
                  (1 <= IBCOMP <= NX)

        Y index of LL corner (JBCOMP)      No default     ! JBCOMP =  1   !
                  (1 <= JBCOMP <= NY)


        X index of UR corner (IECOMP)      No default     ! IECOMP =  88   !
                  (1 <= IECOMP <= NX)

        Y index of UR corner (JECOMP)      No default     ! JECOMP =  88   !
```

```
                  (1 <= JECOMP <= NY)



INPUT GROUP: 6a, 6b, & 6c -- Subgrid scale complex terrain inputs
-------------------------

---------------
Subgroup (6a)
---------------
       Number of terrain features (NHILL)       Default: 0     ! NHILL =  0   !

       Number of special complex terrain
       receptors  (NCTREC)                      Default: 0     ! NCTREC =  0   !

       Terrain and CTSG Receptor data for
       CTSG hills input in CTDM format ?
       (MHILL)                                  No Default     ! MHILL =  0   !
       1 = Hill and Receptor data created
           by CTDM processors & read from
           HILL.DAT and HILLRCT.DAT files
       2 = Hill data created by OPTHILL &
           input below in Subgroup (6b);
           Receptor data in Subgroup (6c)

       Factor to convert horizontal dimensions  Default: 1.0   ! XHILL2M = 1. !
       to meters (MHILL=1)

       Factor to convert vertical dimensions    Default: 1.0   ! ZHILL2M = 1. !
       to meters (MHILL=1)

       X-origin of CTDM system relative to      No Default     ! XCTDMKM = 0.0E00 !
       CALPUFF coordinate system, in Kilometers (MHILL=1)

       Y-origin of CTDM system relative to      No Default     ! YCTDMKM = 0.0E00 !
       CALPUFF coordinate system, in Kilometers (MHILL=1)


INPUT GROUP: 11 -- Chemistry Parameters
---------------

     Ozone data input option (MOZ)     Default: 1            ! MOZ =  0   !
     (Used only if MCHEM = 1 or 3)
        0 = use a constant background ozone value
        1 = read hourly ozone concentrations from
            the OZONE.DAT data file

     Background ozone concentration
     (BCKO3) in ppb                    Default: 80.          ! BCKO3 = 80. !
     (Used only if MCHEM = 1 or 3 and
      MOZ = 0 or (MOZ = 1 and all hourly
      O3 data missing)

     Background ammonia concentration
     (BCKNH3) in ppb                   Default: 10.          ! BCKNH3 = 10. !

     Nighttime SO2 loss rate (RNITE1)
     in percent/hour                   Default: 0.2          ! RNITE1 = 0.2 !

     Nighttime NOx loss rate (RNITE2)
     in percent/hour                   Default: 2.0          ! RNITE2 = 2. !

     Nighttime HNO3 formation rate (RNITE3)
     in percent/hour                   Default: 2.0          ! RNITE3 = 2. !
```

```
INPUT GROUP: 12 -- Misc. Dispersion and Computational Parameters
---------------

     Horizontal size of puff (m) beyond which
     time-dependent dispersion equations (Heffter)
     are used to determine sigma-y and
     sigma-z (SYTDEP)                          Default: 550.   ! SYTDEP = 5.5E02 !

     Switch for using Heffter equation for sigma z
     as above (0 = Not use Heffter; 1 = use Heffter
     (MHFTSZ)                                  Default: 0      ! MHFTSZ =  0   !

     Stability class used to determine plume
     growth rates for puffs above the boundary
     layer (JSUP)                              Default: 5      ! JSUP =  5   !

     Vertical dispersion constant for stable
     conditions (k1 in Eqn. 2.7-3)  (CONK1)    Default: 0.01   ! CONK1 = 0.01 !

     Vertical dispersion constant for neutral/
     unstable conditions (k2 in Eqn. 2.7-4)
     (CONK2)                                   Default: 0.1    ! CONK2 = 0.1 !

     Factor for determining Transition-point from
     Schulman-Scire to Huber-Snyder Building Downwash
     scheme (SS used for Hs < Hb + TBD * HL)
     (TBD)                                     Default: 0.5    ! TBD = 0.5 !
        TBD < 0   ==> always use Huber-Snyder
        TBD = 1.5 ==> always use Schulman-Scire
        TBD = 0.5 ==> ISC Transition-point

     Range of land use categories for which
     urban dispersion is assumed
     (IURB1, IURB2)                            Default: 10     ! IURB1 =  10  !
                                                        19     ! IURB2 =  19  !

     Site characterization parameters for single-point Met data files ---------
     (needed for METFM = 2,3,4)

        Land use category for modeling domain
        (ILANDUIN)                             Default: 20     ! ILANDUIN =  20  !

        Roughness length (m) for modeling domain
        (Z0IN)                                 Default: 0.25   ! Z0IN = 0.25 !

        Leaf area index for modeling domain
        (XLAIIN)                               Default: 3.0    ! XLAIIN = 3. !

        Elevation above sea level (m)
        (ELEVIN)                               Default: 0.0    ! ELEVIN = 0. !

        Latitude (degrees) for met location
        (XLATIN)                               Default: -999.  ! XLATIN = -999. !

        Longitude (degrees) for met location
        (XLONIN)                               Default: -999.  ! XLONIN = -999. !

     Specialized information for interpreting single-point Met data files -----

        Anemometer height (m) (Used only if METFM = 2,3)
        (ANEMHT)                               Default: 10.    ! ANEMHT = 10. !

        Form of lateral turbulance data in PROFILE.DAT file
        (Used only if METFM = 4 or MTURBVW = 1 or 3)
        (ISIGMAV)                              Default: 1      ! ISIGMAV =  2  !
```

```
            0 = read sigma-theta
            1 = read sigma-v

         Choice of mixing heights (Used only if METFM = 4)
         (IMIXCTDM)                          Default: 0      ! IMIXCTDM =  0  !
            0 = read PREDICTED mixing heights
            1 = read OBSERVED mixing heights

      Maximum length of a slug (met. grid units)
      (XMXLEN)                            Default: 1.0    ! XMXLEN = 1. !

      Maximum travel distance of a puff/slug (in
      grid units) during one sampling step
      (XSAMLEN)                           Default: 1.0    ! XSAMLEN = 1. !

      Maximum Number of slugs/puffs release from
      one source during one time step
      (MXNEW)                             Default: 99     ! MXNEW =  99   !

      Maximum Number of sampling steps for
      one puff/slug during one time step
      (MXSAM)                             Default: 99     ! MXSAM =  99   !

      Number of iterations used when computing
      the transport wind for a sampling step
      that includes gradual rise (for CALMET
      and PROFILE winds)
      (NCOUNT)                            Default: 2      ! NCOUNT =  2   !

      Minimum sigma y for a new puff/slug (m)
      (SYMIN)                             Default: 1.0    ! SYMIN = 1.  !

      Minimum sigma z for a new puff/slug (m)
      (SZMIN)                             Default: 1.0    ! SZMIN = 1.  !

      Default minimum turbulence velocities
      sigma-v and sigma-w for each
      stability class (m/s)
      (SVMIN(6) and SWMIN(6))     Default SVMIN : .50,  .50,  .50,  .50,  .50,  .50
                                  Default SWMIN : .20,  .12,  .08,  .06,  .03,  .016

                                Stability Class :  A     B     C     D     E     F
                                                  ---   ---   ---   ---   ---   ---
                                       ! SVMIN = 0.500, 0.500, 0.500, 0.500, 0.500, 0.500!
                                       ! SWMIN = 0.200, 0.120, 0.080, 0.060, 0.030, 0.016!

      Divergence criterion for dw/dz across puff
      used to initiate adjustment for horizontal
      convergence (1/s)
      Partial adjustment starts at CDIV(1), and
      full adjustment is reached at CDIV(2)
      (CDIV(2))                           Default: 0.0,0.0  ! CDIV = 0., 0. !

      Minimum wind speed (m/s) allowed for
      non-calm conditions. Also used as minimum
      speed returned when using power-law
      extrapolation toward surface
      (WSCALM)                            Default: 0.5    ! WSCALM = 0.5 !

      Maximum mixing height (m)
      (XMAXZI)                            Default: 3000.  ! XMAXZI = 3000. !

      Minimum mixing height (m)
      (XMINZI)                            Default: 50.    ! XMINZI = 50. !

      Default wind speed classes --
      5 upper bounds (m/s) are entered;
```

```
     the 6th class has no upper limit
     (WSCAT(5))                      Default   :
                                     ISC RURAL : 1.54, 3.09, 5.14, 8.23, 10,8 (10.8+)

                                Wind Speed Class :  1     2     3     4     5     6
                                                   ---   ---   ---   ---   ---   ---
                                       ! WSCAT = 1.54, 3.09, 5.14, 8.23, 10.80 !

     Default wind speed profile power-law
     exponents for stabilities 1-6
     (PLX0(6))                       Default   : ISC RURAL values
                                     ISC RURAL : .07, .07, .10, .15, .35, .55
                                     ISC URBAN : .15, .15, .20, .25, .30, .30

                                 Stability Class :  A     B     C     D     E     F
                                                   ---   ---   ---   ---   ---   ---
                                       ! PLX0 = 0.07, 0.07, 0.10, 0.15, 0.35, 0.55 !

     Default potential temperature gradient
     for stable classes E, F (degK/m)
     (PTG0(2))                       Default: 0.020, 0.035
                                        ! PTG0 = 0.020,   0.035 !

     Default plume path coefficients for
     each stability class (used when option
     for partial plume height terrain adjustment
     is selected -- MCTADJ=3)
     (PPC(6))                    Stability Class :  A     B     C     D     E     F
                                    Default  PPC : .50,  .50,  .50,  .50,  .35,  .35
                                                   ---   ---   ---   ---   ---   ---
                                        !  PPC = 0.50, 0.50, 0.50, 0.50, 0.35, 0.35 !

     Slug-to-puff transition criterion factor
     equal to sigma-y/length of slug
     (SL2PF)                            Default: 10.        ! SL2PF = 10. !

     Puff-splitting control variables ------------------------

       Number of puffs that result every time a puff
       is split - nsplit=2 means that 1 puff splits
       into 2
       (NSPLIT)                         Default:   3        ! NSPLIT =  3  !

       Time(s) of a day when split puffs are eligible to
       be split once again; this is typically set once
       per day, around sunset before nocturnal shear develops.
       24 values: 0 is midnight (00:00) and 23 is 11 PM (23:00)
       0=do not re-split    1=eligible for re-split
       (IRESPLIT(24))                   Default:  Hour 17 = 1
       !  IRESPLIT = 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,1,0,0,0,0,0,0,0 !

       Split is allowed only if last hour's mixing
       height (m) exceeds a minimum value
       (ZISPLIT)                        Default: 100.       ! ZISPLIT = 100. !

       Split is allowed only if ratio of last hour's
       mixing ht to the maximum mixing ht experienced
       by the puff is less than a maximum value (this
       postpones a split until a nocturnal layer develops)
       (ROLDMAX)                        Default: 0.25       ! ROLDMAX = 0.25 !

     Integration control variables ------------------------

       Fractional convergence criterion for numerical SLUG
       sampling integration
       (EPSSLUG)                        Default:   1.0e-04  ! EPSSLUG = 1.0E-04 !
```

```
       Fractional convergence criterion for numerical AREA
       source integration
       (EPSAREA)                          Default:   1.0e-06  ! EPSAREA = 1.0E-06 !
!END!


------------------------------------------------------------------------------
```

5. Source-by-Source PSD Increment Analysis – Williams Field Services PLA-9 Compressor Station (Scse 08670064)

The following several chapters present source-by-source information that has been used to verify which units at a given source are increment consuming. Separate sections are included (such as this one) for each facility that is subject to the Title V (operating permit) program. That is, it includes sources with emissions greater than 100 tpy. For smaller sources, information such as permit approval date and other less rigorous techniques were used to identify the increment status of a given source.

The modeling in the source-by-source analysis is focused on the source itself. Nearby increment consuming sources are not included in the modeling in most cases. The intent is to provide a snapshot of the impacts on a facility-by-facility basis.

5.1. Discussion

The Title V operating permit indicates that all significant sources of NOx at this facility were installed after the minor source baseline date. Thus, all units consume NO_2 PSD increment.

The generator set listed in the inventory at point 8 has been replaced by point 11, but both points have emissions in the inventory. The generator set has not been including in the refined modeling for this facility.

This source is considered to be a major source in an attainment area (Potential To Emit > 250 Tons/Year) and is considered major for purposes of Prevention of Significant Deterioration (PSD) regulations. Modifications to this point have not triggered significance levels which would bring about PSD review. Subsequent modifications to this facility which are in excess of significance levels as defined in Colorado Regulation No. 3, Part A, Section I, B.58, would result in the application of PSD regulations. Thus, according to Colorado's regulations, the source by itself may not consume more than 75 percent of applicable PSD increments.

ISCST3 modeling by the Division using a 75% Ambient Ratio Method (ARM) to convert atmospheric NO to NO_2 suggests there are violations of the Class II increment near this facility in "ambient air." The maximum annual nitrogen oxides (NOx) impact at the fenceline in ambient air from this source alone is 615 $\mu g/m^3$, without considering the cumulative impact from nearby sources. Most of the adverse fence line impact appears to be from a single engine with poor

dispersion characteristics. Assuming that 75 percent of the emitted NOx exists as NO_2 in the atmosphere in the near-field, the maximum nitrogen dioxide concentration of 461$\mu g/m^3$, well above the Class II PSD increment of 25 $\mu g/m^3$ and above the National Ambient Air Quality Standard. ISC3 is the appropriate refined model to use for situations with building downwash in simple terrain. Thus, a more refined regulatory model is not currently available. The Ozone Limiting Method (OLM) might reduce the level of the fenceline impacts, but probably not enough to bring the maximum concentration below the Class II increment.

It's worth noting that the maximum fenceline impacts occur within tens of meters of the stacks. The confidence of model estimates in the zone is probably low. Thus, significant uncertainties may exist with respect to the modeled maxima at such close-in distances.

In nearby complex terrain, the maximum modeled impact from ISCST3 is 122 $\mu g/m^3$. The COMPLEX screening algorithm in ISCST3 is not the most refined model available for intermediate and complex terrain impacts. For example, significant reductions in the complex terrain impacts might be obtained by using CTSCREEN in combination with either ARM or the Ozone Limiting Method (OLM) to convert NO to NO_2.

It's also possible that the actual emission rates from the units are less than the actual emission rates reported to the Division on APENs. If this is the case, impacts might be reduced significantly if stack test data are used to help estimate actual emissions. Nevertheless, there is still the concern that the impacts based on allowable emissions, which are essentially the same as the actual emissions in this case, may be causing exceedances of the National Ambient Air Quality Standard (NAAQS) for nitrogen dioxide at the fenceline. Slightly higher stacks might eliminate the fenceline NAAQS exceedances, particularly for the generator building stack, which has a height less than the building height.

There may be cumulative impact issues here since the Red Cedar Cox Canyon site is nearby. It not yet clear if the Red Cedar Cox Canyon units are increment consuming, but they have low stack heights. Nevertheless, since specific information is not available, Red Cedar Cox Canyon has been assumed to be increment consuming in this study. Resolution of its increment status may be important to determining increment compliance in this geographic area.

These results are based on the use of 1993 Buena Vista, NM meteorological data. The meteorological site is considered to be reasonable representative of the meteorology that would be expected to occur at this site. Nevertheless, the collection of on-site meteorological data would reduce the level of uncertainty in this modeling analysis. The building dimensions used in the modeling are approximate and based on a review of the plot plan and digital orthophotos. The

source operator provided more typical building dimensions and information regarding the stack location on a typical unit.

In addition, the emission rates used in the modeling are based on actual emissions as reported in recent APENs. It's possible that the engines are cleaner and emit less NOx than reported in the APENs. Refined modeling techniques such as the ozone limiting method and refined complex terrain models like CTSCREEN have not been applied. Refinements to the modeling could lower impacts and might bring the facility into compliance with increments.

The meteorological data set used in this case was recently approved in a modeling protocol for this facility for a proposed major modification. Excerpts from the protocol follow:
The proposed project is located at the entrance of Cottonwood Canyon at an approximate elevation of 6230 feet MSL. Terrain surrounding the canyon extends up to 6700 feet MSL. The canyon floor rises towards the northwest to an elevation of 6500 feet MSL. The canyon floor is relatively flat with steep canyon walls surrounding the project site towards the west and east. The areas surrounding the project site can be characterized as rural complex terrain.

A review of existing meteorological data sets was made that satisfy the requirements as outlined in the PSD monitoring guidelines. In addition, as much of the terrain surrounding the project site location on a regional basis can be described as complex, it is important to find a representative data set that would correctly characterize dispersion of pollutants over the general area.

One meteorological data set, called Buena Vista, (that) was collected approximately 27 kilometers southwest of the project site was identified. The data was collected during 1993 and was obtained from the New Mexico Air Quality Bureau. This data was combined with mixing height data from Albuquerque, New Mexico. This meteorological data set has been used on several PSD permit applications in the area….

…Both project location and monitoring station location…share a similar topography. Both sites are located in a northwest-southeast oriented canyon.

Analyzing the meteorological data set and comparing it to the surrounding terrain shows a similar wind pattern in that canyon orientation plays a significant role in the overall wind pattern. As evident on the wind rose, drainage winds occur or channeled flow conditions are the most numerous….Both sites are located in the same airshed, are separated by approximately 16 miles, have similar vegetation cover surrounding the area, and have similar climatic conditions. Based on the location of PLA-9, and the likelihood of meteorological conditions similar to those observed at the Buena Vista site, the 1993 Buena Vista meteorological site is proposed for use in modeling PLA-9.

5.2. Excerpts from "TECHNICAL REVIEW DOCUMENT FOR OPERATING PERMIT 95OPLP093," July 18, 1997.

This facility is primarily classified as a natural gas compression facility defined under Standard Industrial Classification 4922. Gas is compressed to specification for transmission to sales pipelines using Internal Combustion Engines (ICE) to power compressor units. In addition, glycol dehydrators are used to remove water from the gas stream. The facility is located 2.5 miles southwest of the town of Twin Crossing, south of Durango, La Plata County, Colorado (West ½ of Section 22, Township 22 North, Range 10 West). New Mexico is designated as an affected state within 50 miles of the facility. The facility is located within the boundaries of the Southern Ute Indian Nation. The area in which the plant operates is designated as attainment for all criteria pollutants. Two Federal Class I designated areas, Weminuche Wilderness Area and Mesa Verde National Park, are within 100 kilometers of the plant. This source is considered to be a major source in an attainment area (Potential To Emit > 250 Tons/Year) and is considered major for purposes of Prevention of Significant Deterioration (PSD) regulations. Modifications to this point have not triggered significance levels which would bring about PSD review. Subsequent modifications to this facility which are in excess of significance levels as defined in Colorado Regulation No. 3, Part A, Section I, B.58, would result in the application of PSD regulations. Facility wide emissions are as follows:

Pollutant	Potential to Emit (TPY)	1994 Actual Emissions (TPY)
NOx	206.3	205.3 (same for 1999; see next sections)
CO	309.7	307.8
VOC	153.22	141.3
HAPs	31.93	N/A

Actual emissions were taken from the Aerometric Information Retrieval System (AIRS). No Hazardous Air Pollutants (HAPs) were shown as reported in AIRS. This facility is required to provide an updated APEN in the event that emissions of any of the above air pollutants increase 5% or 50 tons per year, whichever is less, above the level reported on the last APEN submitted to the APCD. Under the guidelines of EPA's Whitepaper for streamlining the operating permit process, actual emissions for the last data year were not required during the application process. Therefore, the Division assumes that emissions from this facility have remained the same or decreased since the last APEN submittal based upon the compliance certification in the operating permit application.

As of 07/25/94, this facility had a potential to emit, for CO, of 247.6 TPY. As mentioned above, a facility becomes major for purposes of PSD when it exceeds 250 TPY of any attainment pollutant. A facility which under maximum operations could exceed the 250 TPY threshold but accepts permit limitations below that level is considered a synthetic minor source for purposes of PSD. It should be cleared up as to whether or not the facility was a synthetic minor (for

PSD) as of 07/25/94. The engines under 91LP072 (8-12) were given lower CO emission limitations than the identical engines permitted under 91LP072 (1-7). This change was enough to keep the facility from becoming a PSD major source. While the difference in emission limitations and emission factors for engines 8-12 kept the facility out of PSD, it can be argued that the engines were still permitted at their maximum capacity but simply with more accurate test data provided for CO (as opposed to manufacturer supplied data for engines 1-7). Numerous stack tests were performed and the engines never approached the lower CO limitations.

Three additional engines were then applied for in 1994, which pushed the facility's PTE over 250 TPY. However, in order for an emission unit(s) to undergo PSD review the facility must: 1) Already be major for PSD and have an increase above PSD significance levels (40 TPY for NOx, 100 TPY for CO), or; 2) The increase in emissions must be major (above 250 TPY) in and of itself. Because the facility was not already major, PSD review could only be triggered by the second scenario. Emissions of NOx and CO from the units were not above 250 TPY for any pollutant and therefore PSD review was not triggered. The installation and permitting of engines has been such that the facility was, up until 1994, an actual minor for purposes of PSD. Since 1994, the facility may be considered major for purposes of PSD. None of the units permitted should be considered a synthetic minor for purposes of keeping increases below PSD significance levels (units permitted at maximum levels).

The following emission units are specifically regulated under terms and conditions of the Operating Permit for this site:

<u>Units S001 - S014</u> - Waukesha Model 7042GL, 4-Cycle, Low-NOx, Standard Lean Burn, Turbocharged, Natural Gas Fired Internal Combustion Compressor Engines. Each engine is rated at 6.43 mmBTU/hr Max Fuel Design Rate. Max Design Horsepower of 1232, Site Rated at 895 HP.

Discussion:

Applicable Requirements- Engine units S001 - S007 were installed and given initial Colorado Construction Permits (91LP072 1-7) on June 4, 1991. Engine Units S008 - S012 were added and given initial Colorado Construction Permits (91LP072 8-12) on September 1, 1993. All twelve engines then received final approval status on July 25, 1994. Two additional engines were added and given initial approval permits (94LP612 1-2) on March 7, 1995. These engines were moved to final approval status on January 23, 1997 based upon the self-certification by the source on November 19, 1996, that the units were fully in compliance with each applicable requirement in their initial approval permit. The following terms and conditions of 91LP072 1-12 and 94LP612 1-2 have been incorporated into the Proposed Operating Permit as applicable requirements: Annual and hourly emission limitations for NOx, CO, VOC, and fuel consumption; 20% Opacity limitation; exhaust oxygen (O_2) content; PSD applicability. Permits 94LP612 1-2 contained a requirement to monitor certain engine parameters to ensure that the engines were in compliance and the facility

was not subject to PSD. However, those monitoring requirements have been replaced with the more accurate portable flue gas monitoring.

Unit S015 - Caterpillar Model G3306 SITA, No Serial Number, 4-Cycle, Standard Lean Burn, Turbocharged, Natural Gas Fired Internal Combustion Engine Operating an Electric Generator. Rated at 1.28 mmBTU/hr Max Fuel Design Rate. Site Rated at 166 Horsepower.
Discussions:
1. Applicable Requirements- This unit was installed and given an initial approval Colorado Construction Permit (94LP612-3) on June 29, 1995. The engine was moved to final approval status on January 23, 1997 based upon the self-certification on November 19, 1996, by the source that the unit was fully in compliance with each applicable requirement in the initial approval permit.
The following terms and conditions of 94LP612-3 have been incorporated into the Proposed Operating Permit as applicable requirements: Annual and hourly emission limitations for NOx, CO, VOC, and fuel consumption; 20% Opacity limitation; PSD applicability. The engine parameter monitoring, as described for permitted units 94LP612 1-2 above, was replaced with portable flue gas monitoring.

Unit S022 - S024 - US Enertek Model J2P20M11109, Glycol Dehydrators using Triethylene Glycol. Serial Numbers: Unit S001 - 42003; Unit S002 - 42267; Unit S003 -42385.
Discussion:
1. Applicable Requirements- Units S022 & S023 were placed in service in 1991. At that time, very little was known about the VOC emissions from the dehydrator still vents. As such, most dehydrators were exempted from permitting requirements based upon their associated reboiler size. However, since that time, emissions from dehydrator still vents have been quantified. Units S022 &S023 obtained initial approval Colorado Construction Permits along with newly installed unit S024 on March 7, 1995 (94LP612 4-6). The dehydrators were moved to final approval status on January 23, 1997 based upon the self-certification by the source that the units were fully in compliance with each applicable requirement in the initial approval permits.
The following terms and conditions of 94LP612 4-6 have been incorporated into the Proposed Operating Permit as applicable requirements: Annual and hourly emission limitations for VOC; annual and daily limits for gas processed; 20% Opacity limitation; PSD applicability; monitoring of glycol consumption.
A future MACT standard is being developed for operations at Oil and Gas facilities which likely will apply to emissions from certain glycol dehydration units. Until such time as this rule is promulgated, no control requirements exist for these units.

5.3. Location Verfication with USGS Digital Orthophoto Quadrangles (DOQs) and Modeling Results

Facility locations and coordinates have been verified with USGS digital orthophoto quadrangles (DOQs). A DOQ is a computer-generated image of an aerial photograph in which displacements caused by terrain relief and camera tilts have been removed. It combines the image characteristics of a photograph with the geometric qualities of a map. In this case, unit specific coordinates have been digitized in ArcView by comparing the source locations on a plot plan with the orthophoto (see figure on the next page).

Note that the DOQ shown on the next page incorrectly indicates that the fenceline is shown. In fact, the property boundary is shown. The fenceline is shown on the page after the DOQ on the modeling configuration graphic.

The configuration used in the model is shown on one of the following figures along with a concentration isopleth plot that shows the modeled NOx impacts from this facility. Nearby sources have NOT been included here. This section of the increment study only shows source-specific modeling. For cumulative impact results, refer to the main report.

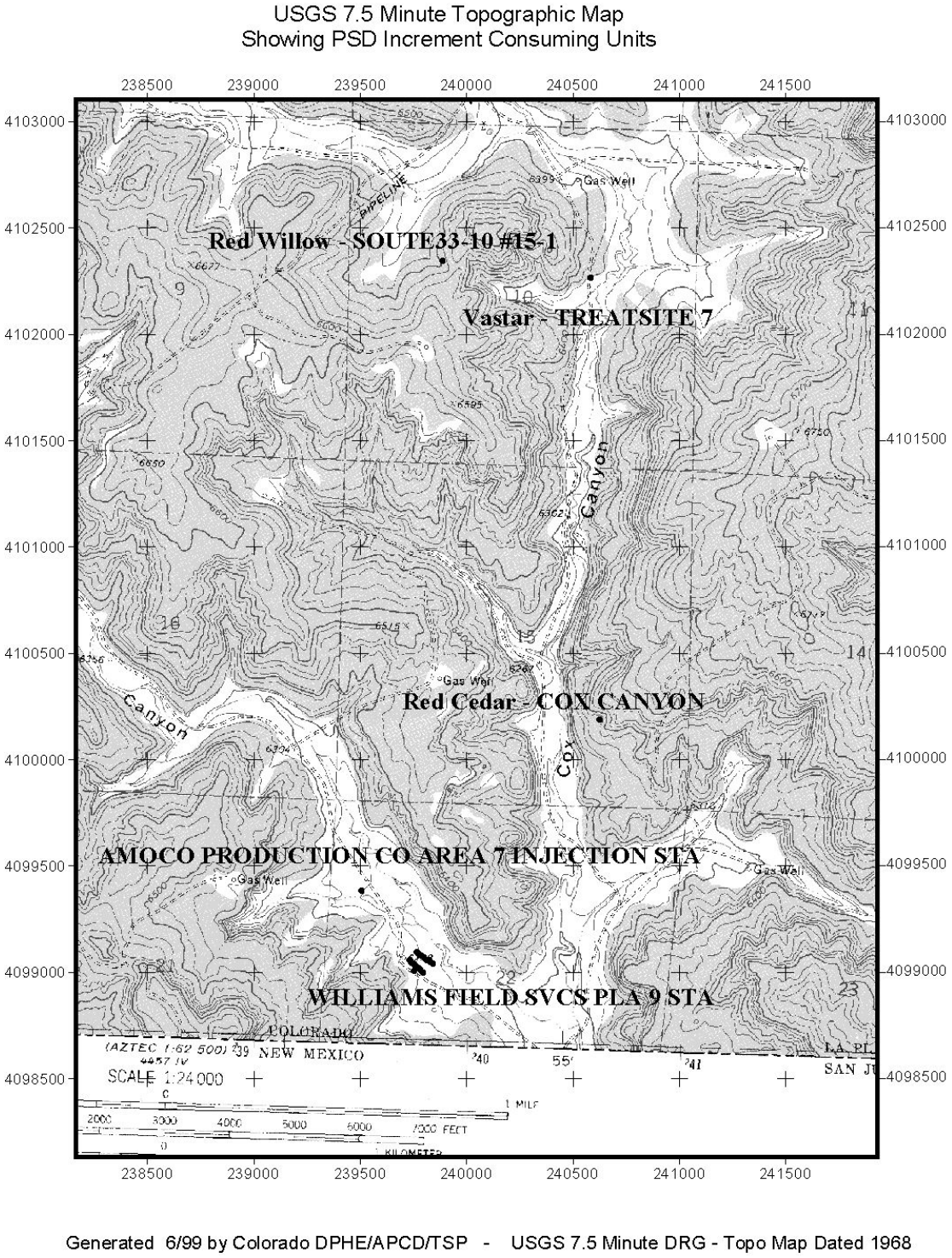
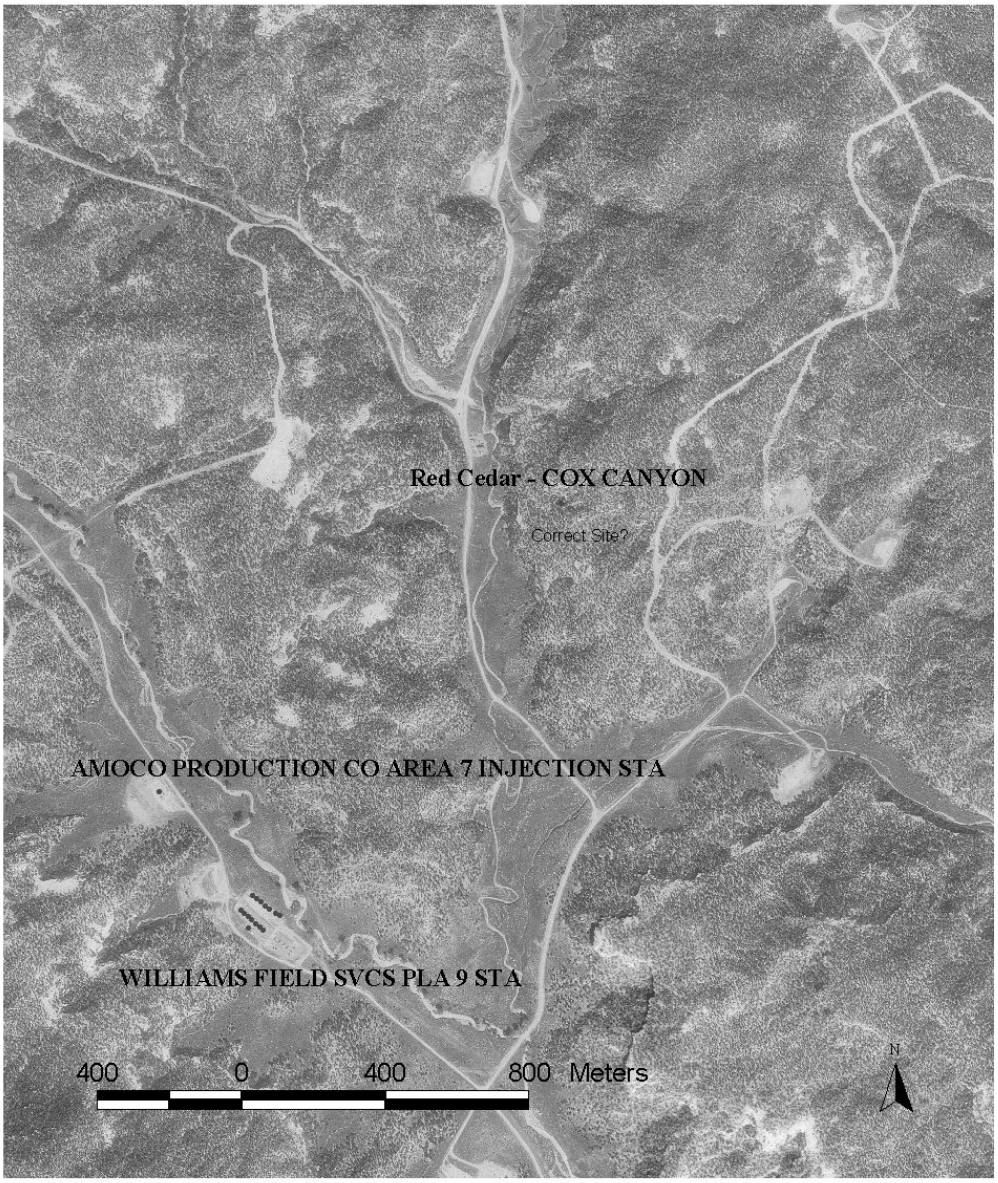


Figure 13. USGS 7.5 minute DRG showing source locations.

Willams Field Services - PLA 9
with Nearby Sources



The coordinates for Red Cedar Fox Canyon do not appear to be correct on this NAD27 projection.
It's not clear from this image if one of the sites up valley is actually the Red Cedar site.
The actual location and increment status need to be verified.

Generated 6/99 by Colorado DPHE/APCD/TSP - USGS Digital Orthophoto Basemap Dated 9/93

Figure 14. USGS DOQ showing PLA-9 and nearby sources.

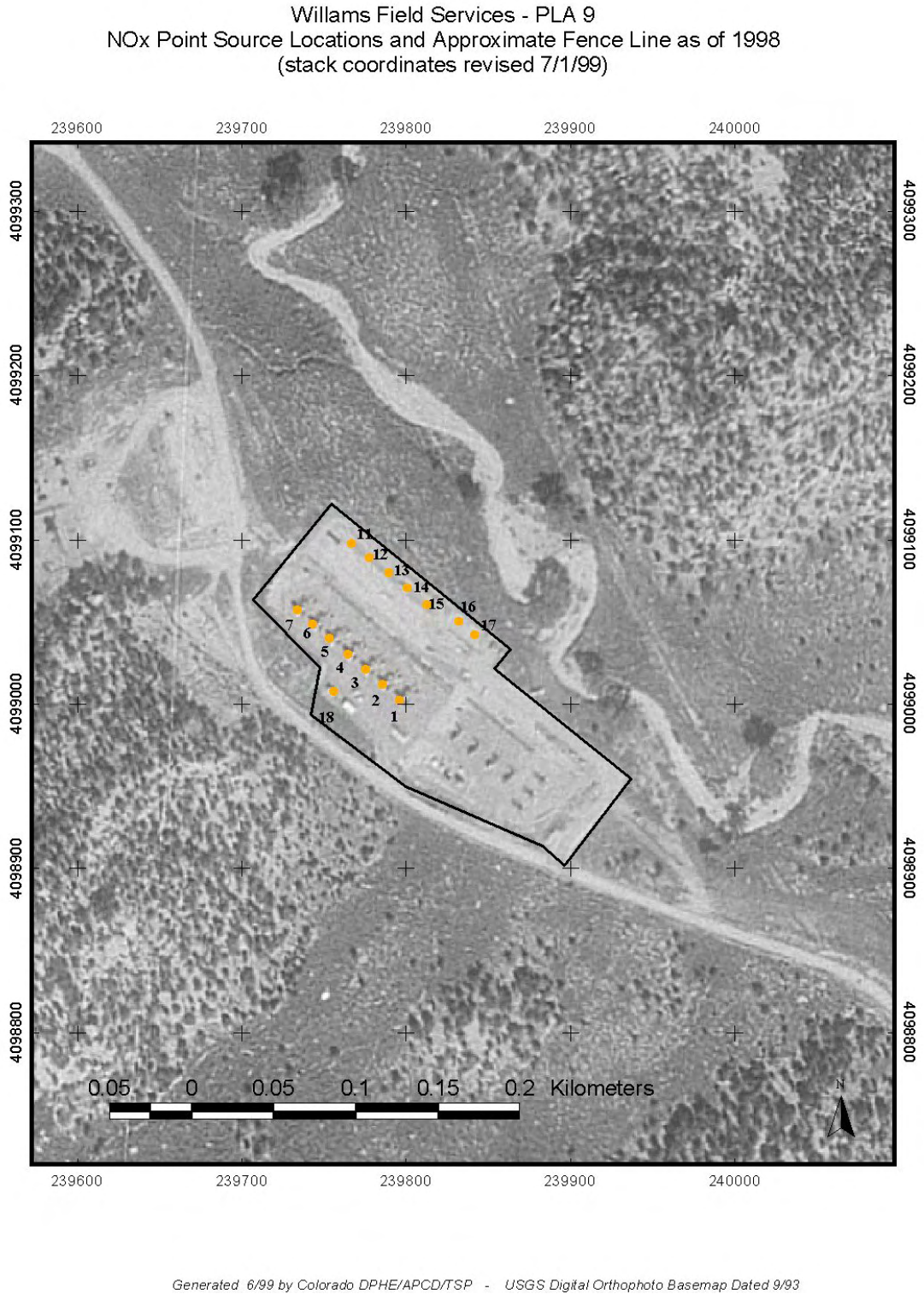


Figure 15. USGS DOQ showing PLA-9.

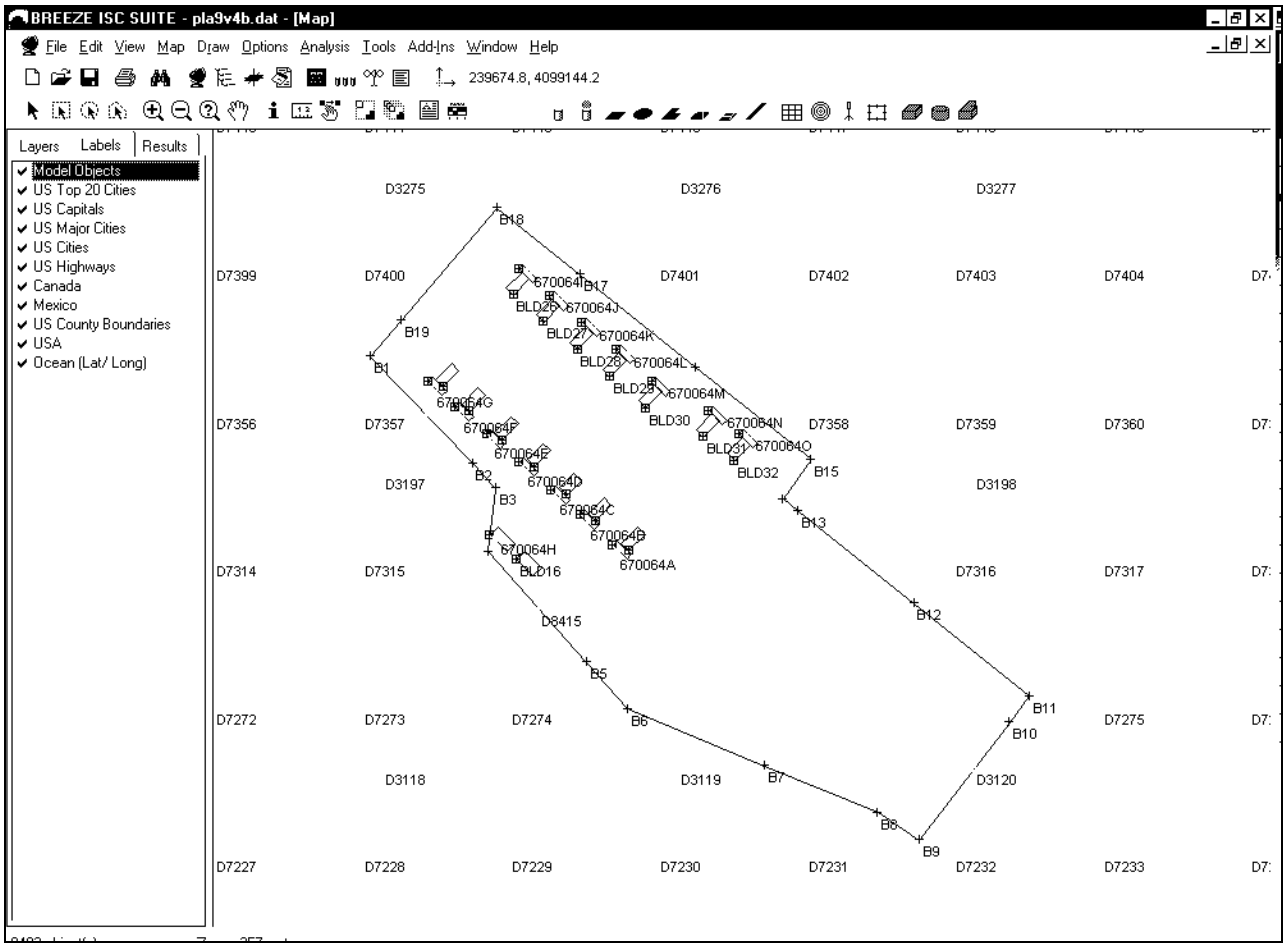
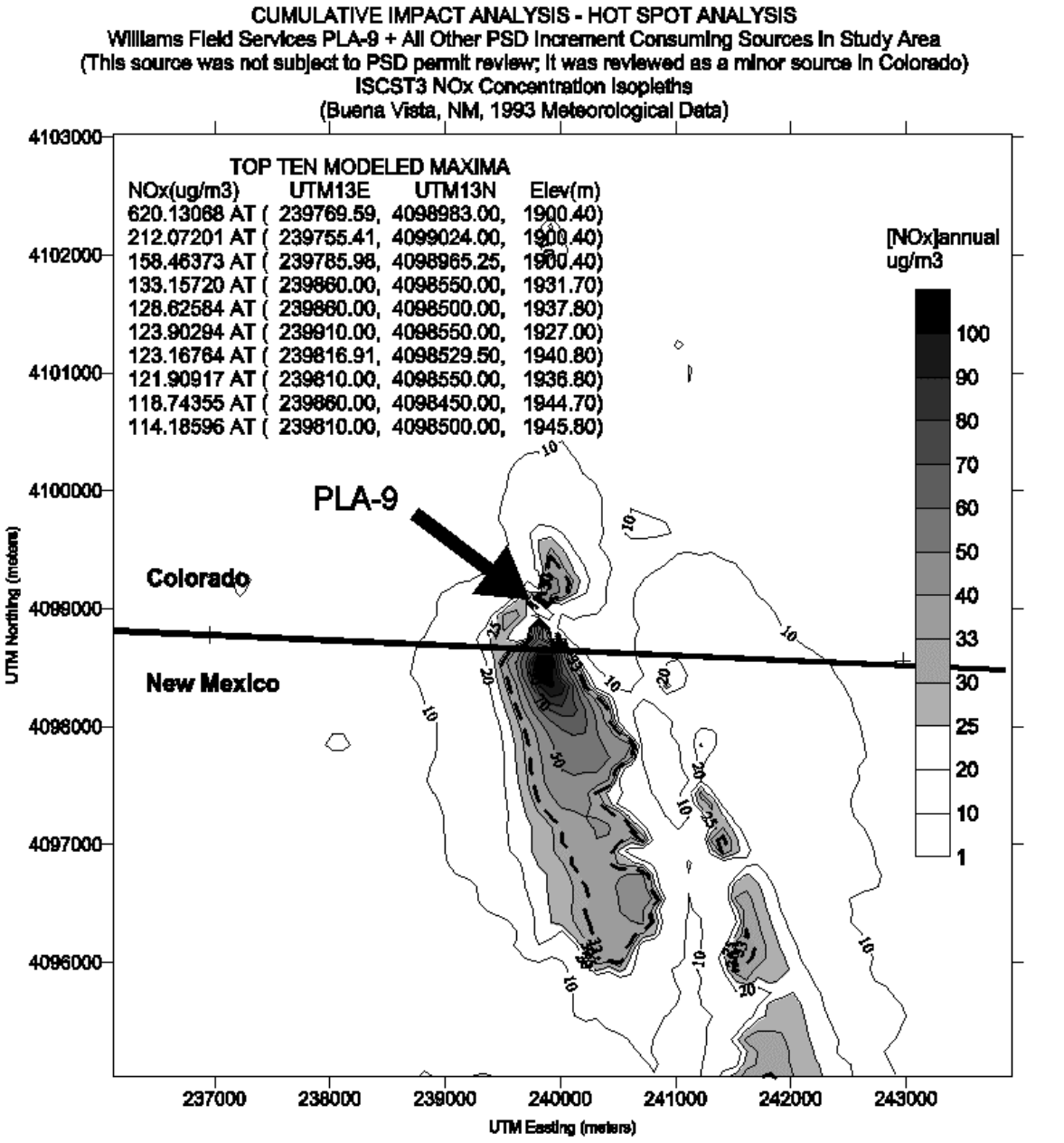


Figure 16. ISCST3 configuration for the WFS PLA-9 facility.

Williams Field Services PLA-9 Compressor Station as modeled. “Building” downwash has been applied to account for aerodynamic downwash from structures (e.g., engine and air cooler) associated with each free-standing unit. Exhaust stacks are shown as circles. The fenceline is shown. It has receptors at least every 50 meters.



Note:
The concentration values listed above and shown on the map are for nitrogen oxides (NOx). The applicable Class II PSD increment is for nitrogen dioxide (NO2). EPA's Ambient Ratio Method allows a national default value of 0.75 to be used to convert NO to NO2. Using ARM, the maximum NO2 concentration is 465 ug/m3 at the fenceline; the maximum in nearby terrain is 100 ug/m3. The dashed line shows the 33.3 ug/m3 contour line where modeled violations of the NO2 PSD Class II increment occur (75%ARM).

Other Methods such as the ozone limiting method could be used to obtain more realistic NO2 estimates. Complex terrain impacts might be reduced significantly if a more refined complex terrain screening model like CTSCREEN is used.

Colorado DPHE/APCD/TSP 7/99 pla9v4c.mf

Figure 17. ISCST3 modeling results in the vicinity of PLA-9.

5.4. Emission Inventory

Table 9. WFS PLA-9 (SCSE 080670064) 1999 emission inventory.

TITLE:	**1999 Emission Inventory**												
Plant Name (PNME):	**WILLIAMS FIELD SVCS PLA 9 STA**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
WAUKESHA 1232HP SN#362478	91LP072-1	WAUKESHA 895 HP #1	91155	-107.924120	37.003020	239795.99	4099002.35	670064a	0.348117	6.71	650.22	29.69	0.31
WAUKESHA 1232HP SN#360634	91LP072-2	WAUKESHA 1232HP #2	91155	-107.924230	37.003100	239786.09	4099011.95	670064b	0.348117	6.71	650.22	29.69	0.31
WAUKESHA 1232HP SN#403117	91LP072-3	WAUKESHA 1232HP #3_403117	91155	-107.924350	37.003180	239775.89	4099020.94	670064c	0.348117	6.71	650.22	29.69	0.31
WAUKESHA 1232HP #C10461/4	91LP072-4	WAUKESHA 1232HP #4	91155	-107.924480	37.003260	239764.80	4099030.24	670064d	0.348117	6.71	650.22	29.69	0.31
WAUKESHA 1160HP #C10461/5	91LP072-5	WAUKESHA 1160HP #5	91155	-107.924610	37.003350	239753.70	4099039.83	670064e	0.348117	6.71	650.22	29.69	0.31
WAUKESHA 1109HP #C10607/1	91LP072-6	WAUKESHA 1109HP #6	91155	-107.924730	37.003420	239743.21	4099048.53	670064f	0.348117	6.71	650.22	29.69	0.31
WAUKESHA 1109HP #C10607/2	91LP072-2	WAUKESHA 1109HP #7	91155	-107.924830	37.003500	239734.21	4099057.23	670064g	0.348117	6.71	650.22	29.69	0.31
CAT 3304 GEN. SET - 72HP	91LP687	CAT 3304 GEN SET		-107.924167	37.003056	239755.92	4099007.23	670064h	0.006643	3.66	877.44	13.17	0.30
WAUKESHA 1117HP #C10985/1	91LP072-8	WAUKESHA 1117HP #8	93244	-107.924470	37.003870	239767.20	4099097.71	670064i	0.348117	6.71	650.22	29.69	0.31
WAUKESHA 1117HP #C10985/3	91LP072-9	WAUKESHA 1117HP #9	93244	-107.924350	37.003790	239777.99	4099089.01	670064j	0.348117	6.71	650.22	29.69	0.31
WAUKESHA 1117HP #C10985/8	91LP072-10	WAUKESHA 1117HP #10	93244	-107.924220	37.003710	239789.39	4099079.72	670064k	0.348117	6.71	650.22	29.69	0.31
WAUKESHA 1117HP #C10985/7	91LP072-11	WAUKESHA 1117HP #11	93244	-107.924080	37.003630	239801.08	4099070.42	670064l	0.348117	6.71	650.22	29.69	0.31
WAUKESHA 1232HP #C11059/1	91LP072-12	WAUKESHA 1232HP #12	93244	-107.923950	37.003550	239812.78	4099060.23	670064m	0.348117	6.71	650.22	29.69	0.31
WAUKESHA 895HP #13	94LP612-1	WAUKESHA 895HP #13	95066	-107.923730	37.003460	239832.27	4099050.03	670064n	0.311469	6.71	650.22	29.69	0.30
WAUKESHA 895HP #14	94LP612-2	WAUKESHA 895HP #14	95066	-107.923620	37.003390	239841.86	4099042.23	670064o	0.348117	6.71	650.22	29.69	0.30
CATERPILLAR 166HP ENGINE	94LP612-3	CATERPILLAR 166HP ENGINE	95180	-107.924570	37.003050	239756.10	4099007.45	670064p	1.061613	2.44	866.33	44.41	0.12
								total=	**5.90525**	**g/s =**	**205.26**	**ton/yr**	

Key:
SCSE = Plant ID number XXYYYZZZZ where XX=FIPS State, YYY=FIPS County, ZZZZ=NEDS plant Number
PNME = Plant Name
DSC3 = Construction Permit Number
EPDS = Point Description
DSC4 = Segment Description
SD07 = Initial permit approval date [Julian date: YYDDD]
LATITUDE = latitude in decimal degrees
LONGITUDE = longitude in decimal degrees
UTM13E = Zone 13 Universal Tranverse Mercator (UTM) easting (meters)
(UTM 1927,Clarke 1866,Central Meridian=-105,Ref Latitude=0,False Easting=500000,False Northing=0
UTM13N = Zone 13 UTM Northing (meters)
NOX_gps = Estimated Actual Emission Rate as Reported on APEN (grams per second, long-term)
StkH_m = Stack Height (meters)
StkT_K = Stack Gas Exit Temperature (Kelvin)
StkV_mps = Stack Gas Exit Velocity (meters per second)
StkD_m = Stack Diameter (meters)

Table 10. WFS PLA-9 (SCSE 080670064) 1989 emission inventory and increment inventory.

TITLE:	**1989 Emission Inventory**												
Plant Name (PNME):	**WILLIAMS FIELD SVCS PLA 9 STA**												
	This source did not exist in 1989.												

TITLE:	**Change in Actual Emissions Between 1989 and 1999 (positive emissions = increment consumption; negative = increment expansion)**												
	(positive emissions = increment consumption; negative emissions = increment expansion)												
Source ID (SCSE):	**080670064**												
Plant Name (PNME):	**WILLIAMS FIELD SVCS PLA 9 STA**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
WAUKESHA 1232HP SN#362478	91LP072-1	WAUKESHA 895 HP #1	91155	-107.924120	37.003020	239795.99	4099002.35	670064a	0.348117	6.71	650.22	29.69	0.31
WAUKESHA 1232HP SN#360634	91LP072-2	WAUKESHA 1232HP #2	91155	-107.924230	37.003100	239786.09	4099011.95	670064b	0.348117	6.71	650.22	29.69	0.31
WAUKESHA 1232HP SN#403117	91LP072-3	WAUKESHA 1232HP #3_403117	91155	-107.924350	37.003180	239775.89	4099020.94	670064c	0.348117	6.71	650.22	29.69	0.31
WAUKESHA 1232HP #C10461/4	91LP072-4	WAUKESHA 1232HP #4	91155	-107.924480	37.003260	239764.80	4099030.24	670064d	0.348117	6.71	650.22	29.69	0.31
WAUKESHA 1160HP #C10461/5	91LP072-5	WAUKESHA 1160HP #5	91155	-107.924610	37.003350	239753.70	4099039.83	670064e	0.348117	6.71	650.22	29.69	0.31
WAUKESHA 1109HP #C10607/1	91LP072-6	WAUKESHA 1109HP #6	91155	-107.924730	37.003420	239743.21	4099048.53	670064f	0.348117	6.71	650.22	29.69	0.31
WAUKESHA 1109HP #C10607/2	91LP072-2	WAUKESHA 1109HP #7	91155	-107.924830	37.003500	239734.21	4099057.23	670064g	0.348117	6.71	650.22	29.69	0.31
CAT 3304 GEN. SET - 72HP	91LP687	CAT 3304 GEN SET		-107.924167	37.003056	239755.92	4099007.23	670064h	0.006643	3.66	877.44	13.17	0.30
WAUKESHA 1117HP #C10985/1	91LP072-8	WAUKESHA 1117HP #8	93244	-107.924470	37.003870	239767.20	4099097.71	670064i	0.348117	6.71	650.22	29.69	0.31
WAUKESHA 1117HP #C10985/3	91LP072-9	WAUKESHA 1117HP #9	93244	-107.924350	37.003790	239777.99	4099089.01	670064j	0.348117	6.71	650.22	29.69	0.31
WAUKESHA 1117HP #C10985/8	91LP072-10	WAUKESHA 1117HP #10	93244	-107.924220	37.003710	239789.39	4099079.72	670064k	0.348117	6.71	650.22	29.69	0.31
WAUKESHA 1117HP #C10985/7	91LP072-11	WAUKESHA 1117HP #11	93244	-107.924080	37.003630	239801.08	4099070.42	670064l	0.348117	6.71	650.22	29.69	0.31
WAUKESHA 1232HP #C11059/1	91LP072-12	WAUKESHA 1232HP #12	93244	-107.923950	37.003550	239812.78	4099060.23	670064m	0.348117	6.71	650.22	29.69	0.31
WAUKESHA 895HP #13	94LP612-1	WAUKESHA 895HP #13	95066	-107.923730	37.003460	239832.27	4099050.03	670064n	0.311469	6.71	650.22	29.69	0.30
WAUKESHA 895HP #14	94LP612-2	WAUKESHA 895HP #14	95066	-107.923620	37.003390	239841.86	4099042.23	670064o	0.348117	6.71	650.22	29.69	0.30
CATERPILLAR 166HP ENGINE	94LP612-3	CATERPILLAR 166HP ENGINE	95180	-107.924570	37.003050	239756.10	4099007.45	670064p	1.061613	2.44	866.33	44.41	0.12
								total=	**5.90525**	**g/s =**	**205.26**	**ton/yr**	

6. Source-by-Source PSD Increment Analysis – Williams Field Services Ignacio B Plant (Scse 08670006)

6.1. Discussion

The Title V operating permit indicates that most of the sources of NOx at this facility were installed before the major or minor source baseline dates for nitrogen dioxide. Two units have been identified as increment consuming: 1) P011 - **Solar Centaur Model 40-T4700S, Natural Gas Fired Turbine Site-Rated at 3,659 HP** ; and 2) P029 - **Amine Regeneration Unit, Model Not Provided, Serial Number Not Provided, Steam Reboiler, Rated at 500 MMSCF Per Day, With a Callidus Technologies Thermal Oxidizer, Rated at 10.1 MMBtu Per Hour** . Thus, only the two new units and changes in actual emissions between the minor source baseline date at the present at existing units can affect PSD increments. In this case, it has been assumed that actual emissions in 1989 and current actual emissions are the same for units that existed in both time periods. Thus, only the two new sources identified above have been included in the inventory as NO_2 PSD increment consuming source s in this study. Emission credits from retired baseline sources at this facility have not been quantified for this study.

Please note that the Title V review (next section) does not include the La Plata A compressor station for which a separate operating permit is planned.

ISCST3 modeling by the Division using a 75% Ambient Ratio Method (ARM) to convert atmospheric NO to NO_2 suggests there are NOT violations of the Class II increment near these facilities in "ambient air." The maximum annual nitrogen oxides (NOx) impact is 15.7 $\mu g/m^3$, without considering the cumulative impact from nearby sources. Assuming that 75 percent of the emitted NOx exists as NO_2 in the atmosphere in the near-field, the maximum nitrogen dioxide concentration of 11.8 $\mu g/m^3$, which is below the Class II PSD increment of 25 $\mu g/m^3$.

Building downwash has not been modeled at these source complexes. Thus, it's possible that fenceline hot spots may exist.

6.2. Excerpts from "TECHNICAL REVIEW DOCUMENT FOR OPERATING PERMIT 95OPLP032," July 6, 1999 (draft)

Source Description:

This source is classified as a natural gas liquids production facility defined under Standard Industrial Classification 1321. The Ignacio Gas Conditioning Plant is a natural gas processing plant designed to compress natural gas and separate moisture and natural gas liquids from the gas stream prior to transmission to sales pipelines. The primary plant operations include inlet compression plants, two glycol dehydration units, an amine unit that removes carbon dioxide from the gas stream, a molecular sieve dehydrator, a turbo expander plant for cryogenic removal of natural gas liquids, a fractionation plant and recompression turbines. The natural gas liquids are transported off-site through pipelines or by tanker trucks utilizing natural gas liquids storage and loading facilities.

The facility is located in a rural area approximately 20 miles southeast of Durango near Ignacio in La Plata County. This source is major and future modifications at the facility which trigger PSD significance levels as defined in Colorado Regulation No. 3, Part A, Section I.B.58 will require analysis of Best Available Control Technology (BACT) for the unit(s) in question. Facility-wide potential and actual emissions are as follows:

Pollutant	Potential to Emit (tpy)	Actual (tpy)
NOx	2301.8	1616.7 (see next sections for values used in modeling)
VOC	686.6	161.0
CO	461.4	243.3

Potential emissions are taken from the construction permits for this facility and from the revised APENs submitted with the January 1999 resubmittal. Actual emissions are taken from AIRS data sheets issued in May of 1995, with the addition of emission estimates for fugitives and the amine regeneration unit. The fugitive and amine unit emissions were assumed to be equal to PTE, lacking any measured data to show otherwise. The Division assumes that emissions from the facility have remained the same or decreased from the levels listed above.

The applicant certified that the facility was in compliance with all applicable requirements at the time of the January 1999 submittal of additional information. The applicant also indicated, in that resubmittal, that the facility is subject to 112(r), the Accidental Release Prevention Program of the Federal Clean Air Act.

Emission Sources:

The following sources are specifically regulated under terms and conditions of the operating permit for this Site:

Unit P001- Struthers Natural Gas Fired Regeneration Heater (standby unit) Rated at 13.02 MMBTU, Model IF-10, Serial No. MM085347 M050102

Unit P022- C.E. Natco Natural Gas Fired Regeneration Heater Rated at 18.05 MMBTU, Model MN620740009020, Serial No. N4-0027-01

Discussion:

1. Applicable Requirements- Prior to Title V application submittal, Colorado Emission Permit 84LP109 defined applicable requirements for these heaters. Subsequent to the original application submittal, this permit was modified and issued on May 30, 1997. This permit specifies the Natco heater as the primary heater and the Struthers heater as a backup to be used only when the Natco heater is not in operation. In addition, the applicant, in a January 1999 resubmittal, provided revised APENs that requested modified permit limits. The terms contained in the Construction Permit, as modified by the revised APEN, are as follows:

Parameter	Short Term Limit	Long Term Limit
NOx	None	11.3 tons/yr
CO	None	6.7 tons/yr
PM_{10}	None	1.1 tons/yr
Fuel Use	None	162,060 MMBtu/yr

As mentioned above, the short-term limits were not incorporated into the Operating Permit. The Regulation No. 1 particulate limit for fuel burning equipment was included as an applicable requirement because it defines a short-term limit. The annual PM_{10} limit was not included in the Operating Permit because the limit is below APEN de minimis levels. The annual NOx, CO and fuel use limitations and the 20% opacity limit was incorporated into the Operating Permit.

2. Emission Factors- Emissions from these heaters are produced during the combustion process, and are dependent upon certain operating parameters and specific properties of the natural gas being burned. The pollutants of concern are nitrogen oxides (NOx, carbon monoxide (CO) and volatile organic compounds (VOCs). Small quantities of Hazardous Air Pollutants (HAPs) are also emitted when combustion is incomplete. NOx and CO emissions were calculated using AP-42 emission factors converted to heat-based factors. The converted emission factors are as follows:

Pollutant	Emission Factor	Source
NOx	0.098 lb/MMBtu	AP-42

CO	0.082 lb/MMBtu	AP-42

Unit P003-General Electric Model M3142, Natural Gas Fired Turbine Site-Rated at 10,150 HP, Serial No. Not Provided

Discussion:

1. Applicable Requirements- This source was installed in 1972 and this turbine was permitted at that time for unrestricted operation. During a 1989 ownership modification, and again in 1994, permit 10LP076 was inappropriately modified to include emission and fuel use limits. In 1996, WFS requested that this permit be invalidated, making this turbine a grandfathered source. Consequently, the only applicable requirements for this turbine are a 20% opacity limitation, the Regulation No. 1 particulate limitation and APEN reporting in accordance with Regulation No. 3, Part A.II.

2. Emission Factors- Emissions from this turbine are produced during the combustion process, and are dependent upon certain operating parameters and specific properties of the natural gas being burned. The pollutants of concern are nitrogen oxides (NOx), carbon monoxide (CO) and volatile organic compounds (VOCs). Small quantities of Hazardous Air Pollutants (HAPs) are also emitted when combustion is incomplete.
:
The emission factors to calculate NOx and CO emissions are derived from stack tests conducted in November of 1995. These emission factors are as follows:

Pollutant	Emission Factor	Source
NOx	56.16 lb/hr	Conversion
CO	2.76 lb/hr	Conversion

These emission factors are acceptable to the Division because they are based on actual stack tests.

Unit P004 – through P010 — Clark Model TLA-6, Natural Gas Fired 4 Cycle Standard Rich Burn Internal Combustion Engine Site-Rated at 2,000 HP, Serial Numbers Not Provided

Discussion:

1. Applicable Requirements- These engines were installed in 1956 and 1957, making them grandfathered sources under Colorado Regulation No. 3. Consequently, the only

applicable requirements for these sources are a 20% opacity limitation and APEN reporting in accordance with Regulation No. 3, Part A.II.

2. Emission Factors- Emissions from these reciprocating engines are produced during the combustion process, and are dependent upon the air to fuel ratio adjustment and specific properties of the natural gas being burned. The pollutants of concern are nitrogen oxides (NOx), carbon monoxide (CO) and volatile organic compounds (VOCs). Small quantities of Hazardous Air Pollutants (HAPs) are also emitted when combustion is incomplete. The applicant proposes to calculate NOx, CO and VOC emissions using emission factors that are approximately equal to, or slightly higher than, AP-42 Table 3.2-2. These emission factors are as follows:

Pollutant	Emission Factor	Source
NOx	9.532 g/hphr	Mfr data
CO	2.401 g/hphr	AP-42
VOC	4.199 g/hphr	AP-42

These emission factors are acceptable to the Division because the Division considers AP-42 factors to be default values.

Unit P011- Solar Centaur Model 40-T4700S, Natural Gas Fired Turbine Site-Rated at 3,659 HP, Serial No. 4722C

Discussion:

1. Applicable Requirements - Colorado Emission Permit 96LP237 was issued in July of 1996 which defined applicable requirements for the turbine described above. Permit 96LP237 established hourly and annual emission limits for NOx, CO, VOC and PM_{10}, as well as hourly and annual fuel use limits. It also required the completion of a compliance test to verify emissions of NOx and CO. The terms contained in Permit 96LP237 are as follows:

Parameter	Short Term Limit	Long Term Limit
NOx	7.1 lbs/hr	30.7 tons/yr
VOC	1.5 lbs/hr	6.4 tons/yr
CO	5.1 lbs/hr	22.3 tons/yr
PM_{10}	0.6 lbs/hr	2.2 tons/yr
Fuel Use	36,416 scf/hr	319.0 MMscf/yr

As mentioned above, the short term limits listed above were not incorporated into the Operating Permit. The Regulation No. 1 particulate limit for fuel burning equipment and a NOx exhaust gas concentration limit of 42 ppmv were the only short term limits included as applicable requirements. The annual NOx, VOC, CO, PM_{10} and fuel use limitations and the 20% opacity limit were incorporated into the Operating Permit.

Construction Permit 96LP237 also established this turbine as being subject to NSPS Subpart GG, including limitations on the turbine exhaust gas NOx concentration (150 ppmv) and exhaust gas SO_2 concentration or the fuel sulfur content. Subpart GG requires that turbine fuel be analyzed for sulfur content and that the sulfur dioxide emissions cannot exceed 0.015% by volume at 15% O_2 on a dry basis and that the sulfur content of the fuel cannot exceed 0.8% by weight. Based on engineering judgement, the Division has determined that the exclusive use of natural gas as a fuel is sufficient to monitor compliance with these standards. The appropriate limitations and recordkeeping and reporting requirements contained in Subpart GG have been incorporated into the draft Operating Permit.

2. Emission Factors- Emissions from this turbine are produced during the combustion process, and are dependent upon certain operating parameters and specific properties of the natural gas being burned. The pollutants of concern are nitrogen oxides (NOx), carbon monoxide (CO) and volatile organic compounds (VOCs). Small quantities of Hazardous Air Pollutants (HAPs) are also emitted when combustion is incomplete.

The emission factors that used to calculate NOx, VOC, CO and PM_{10} emissions are derived from the annual NOx, VOC, CO and PM_{10} limits, listed above, and the maximum design fuel rate of the turbine. Detailed calculations demonstrating this derivation are provided in the attached Summary of Emission Factor Derivations. These emission factors are as follows:

Pollutant	Emission Factor	Source
NOx	0.201 lb/MMBtu	Conversion
CO	0.146 lb/MMBtu	Conversion
VOC	0.042 lb/MMBtu	Conversion
PM_{10}	0.014 lb/MMBtu	Conversion

The emission factors for NOx and CO are lower than corresponding AP-42 emission factors. They are acceptable to the Division because they are derived from manufacturer data and because the source is required to monitor emissions on a periodic basis.

Units P018/P019 — **Vogt Natural Gas Fired Boiler Rated at 18.0 MMBTU, Model CL. VV-22.5, Serial Nos. 1710 and 1711**

Discussion:

1. Applicable Requirements- These boilers were installed in 1956, making them grandfathered sources under Colorado Regulation No. 3. Consequently, the only applicable requirements for these sources are a 20% opacity limitation, the Regulation No. 1 particulate limitation and APEN reporting in accordance with Regulation No. 3, Part A.II.

2. Emission Factors- Emissions from these boilers are produced during the combustion process, and are dependent upon certain operating parameters and specific properties of the natural gas being burned. The pollutants of concern are nitrogen oxides (NOx) and carbon monoxide (CO) and volatile organic compounds (VOCs). Small quantities of Hazardous Air Pollutants (HAPs) are also emitted when combustion is incomplete. NOx and CO emissions were calculated using AP-42 emission factors converted to heat-based factors. The converted emission factors are as follows:

Pollutant	Emission Factor	Source
NOx	0.098 lb/MMBtu	AP-42
CO	0.082 lb/MMBtu	AP-42

Units P020/P021 — **General Electric Model M3142J, Natural Gas Fired Turbines Site-Rated at 10,700 HP, Serial Nos. 282514 and 282515**

Discussion:

1. Applicable Requirements- Colorado Emission Permits 83LP248-1 Mod 1 and 83LP248-2 Mod 1 were issued in December of 1998 which defined applicable requirements for the turbines described above (these turbines are covered by a PSD permit issued by EPA). These permits established annual emission limits for NOx, CO, VOC and PM_{10}, as well as monthly and annual fuel use limits. It also required the completion of a compliance test to verify emissions of NOx, VOC and CO. The terms contained in each of these permits are as follows:

Parameter	Short Term Limit	Long Term Limit
NOx	N/A	227.76 tons/yr
VOC	N/A	7.30 tons/yr
CO	N/A	35.04 tons/yr
PM_{10}	N/A	10.95 tons/yr
Fuel Use	76.5 MMscf/mo	918.0 MMscf/yr

As mentioned above, the short term limits listed above were not incorporated into the Operating Permit. The Regulation No. 1 particulate limit for fuel burning equipment and a NOx exhaust gas concentration limit of 138 ppmv were the only short term limits included as applicable requirements. The annual NOx, VOC, CO, PM_{10} and fuel use limitations and the 20% opacity limit were incorporated into the Operating Permit.

Construction Permit 83LP248-1 and -2 also established these turbines as being subject to NSPS Subpart GG, including limitations on the turbine exhaust gas NOx concentration (150 ppmv) and exhaust gas SO_2 concentration or the fuel sulfur content. Subpart GG requires that turbine fuel be analyzed for sulfur content and that the sulfur dioxide emissions cannot exceed 0.015% by volume at 15% O_2 on a dry basis and that the sulfur content of the fuel cannot exceed 0.8% by weight. Based on engineering judgement, the Division has determined that the exclusive use of natural gas as a fuel is sufficient to monitor compliance with these standards. The appropriate limitations and recordkeeping and reporting requirements contained in Subpart GG have been incorporated into the draft Operating Permit.

2. Emission Factors- Emissions from these turbines are produced during the combustion process, and are dependent upon certain operating parameters and specific properties of the natural gas being burned. The pollutants of concern are nitrogen oxides (NOx), carbon monoxide (CO) and volatile organic compounds (VOCs). Small quantities of Hazardous Air Pollutants (HAPs) are also emitted when combustion is incomplete.

The emission factors that used to calculate NOx, VOC, CO and PM_{10} emissions are derived from the annual NOx, VOC, CO and PM_{10} limits, listed above, and the maximum design fuel rate of the turbine. Detailed calculations demonstrating this derivation are provided in the attached Summary of Emission Factor Derivations. These emission factors are as follows:

Pollutant	Emission Factor	Source
NOx	0.487 lb/MMBtu	Conversion
CO	0.075 lb/MMBtu	Conversion
VOC	0.016 lb/MMBtu	Conversion
PM_{10}	0.023 lb/MMBtu	Conversion

The emission factors for NOx and CO are lower than corresponding AP-42 emission factors. They are acceptable to the Division because they are derived from manufacturer data and because the source is required to monitor emissions on a periodic basis.

<u>Unit P029</u>- Amine Regeneration Unit, Model Not Provided, Serial Number Not Provided, Steam Reboiler, Rated at 500 MMSCF Per Day, With a Callidus Technologies Thermal Oxidizer, Rated at 10.1 MMBtu Per Hour

Discussion:

1. Applicable Requirements - Colorado Emission Permit 97LP0315 was issued in December of 1998 which defined applicable requirements for the dehydration unit described above. Emissions from the regenerator vent are routed to the thermal oxidizer, which has an assumed control efficiency of 99 percent. Permit 97LP0315 established an annual emission limit for VOC, expressed as a combined limit from the thermal oxidizer. It also established annual NOx and CO emission limits, as well as a maximum amine recirculation rate limit, monthly and annual supplemental fuel limits for the thermal oxidizer and monthly and annual limits on the amount of natural gas processed by the amine unit. It also required the completion of a compliance test to verify emissions of VOC, NOx and CO from the thermal oxidizer. The terms contained in this permit are as follows:

	Short	Long
<u>Parameter</u>	<u>Term Limit</u>	<u>Term Limit</u>
VOC	N/A	4.11 tons/yr
NOx	N/A	21.06 tons/yr
CO	N/A	12.82 tons/yr
Recirc rate	1,740 gpm	N/A
Fuel use	8.11 MMscf/mo	97.23 MMscf/yr
Throughput	15,208 MMscf/mo	182,500 MMscf/yr

As mentioned above, the short term fuel use and throughput limits listed above are not incorporated into the Operating Permit. The recirculation rate limit will be the only short term limit included as an applicable requirement. The annual VOC, NOx, CO and throughput limitations and the 20% opacity limit were incorporated into the Operating Permit.

This source was reviewed under the Prevention of Significant Deterioration regulations and a Best Available Control Technology determination was made at that time. It was determined that BACT would consist of routing the amine regeneration unit emissions through a thermal oxidizer capable of achieving a minimum VOC destruction efficiency of 99 percent. The Division has determined that this can be assured by operating the thermal oxidizer at a temperature no lower than 1600 °F. These requirements have been incorporated into the draft Operating Permit.

2. **Emission Factors -** Amine is contacted with the natural gas stream to remove carbon dioxide. The amine is then heated in the regeneration unit to drive off carbon dioxide, which also drives off VOCs that were absorbed from the gas stream. The

heater for this unit uses plant steam as the heat source and there are no combustion emissions. Emissions from the regeneration vent are typically predicted using stack tests of the actual or similar units because computer models have not been developed for this process. Emissions of VOCs and associated HAPs are dependent on process operating parameters that are input into this model. These parameters include the amine recirculation rate, the amount of gas processed and a breakdown of the constituents in the natural gas. VOC emissions were calculated using stack test results from the regenerator vent, assuming a 99 percent control efficiency for the thermal oxidizer. This control efficiency is assumed based on a minimum oxidizer operating temperature of 1,600°F. The NOx and CO emission factors are manufacturer's data derived from stack tests performed on the thermal oxidizer exhaust gas stream.

6.3. Location Verfication with USGS Digital Orthophoto Quadrangles (DOQs) and Modeling Results

Facility locations and coordinates have been verified with USGS digital orthophoto quadrangles (DOQs). A DOQ is a computer-generated image of an aerial photograph in which displacements caused by terrain relief and camera tilts have been removed. It combines the image characteristics of a photograph with the geometric qualities of a map. In this case, unit specific coordinates have been digitized in ArcView by comparing the source locations on a plot plan with the orthophoto (see figure on the next page).

The DOQ also shows several nearby facilities.

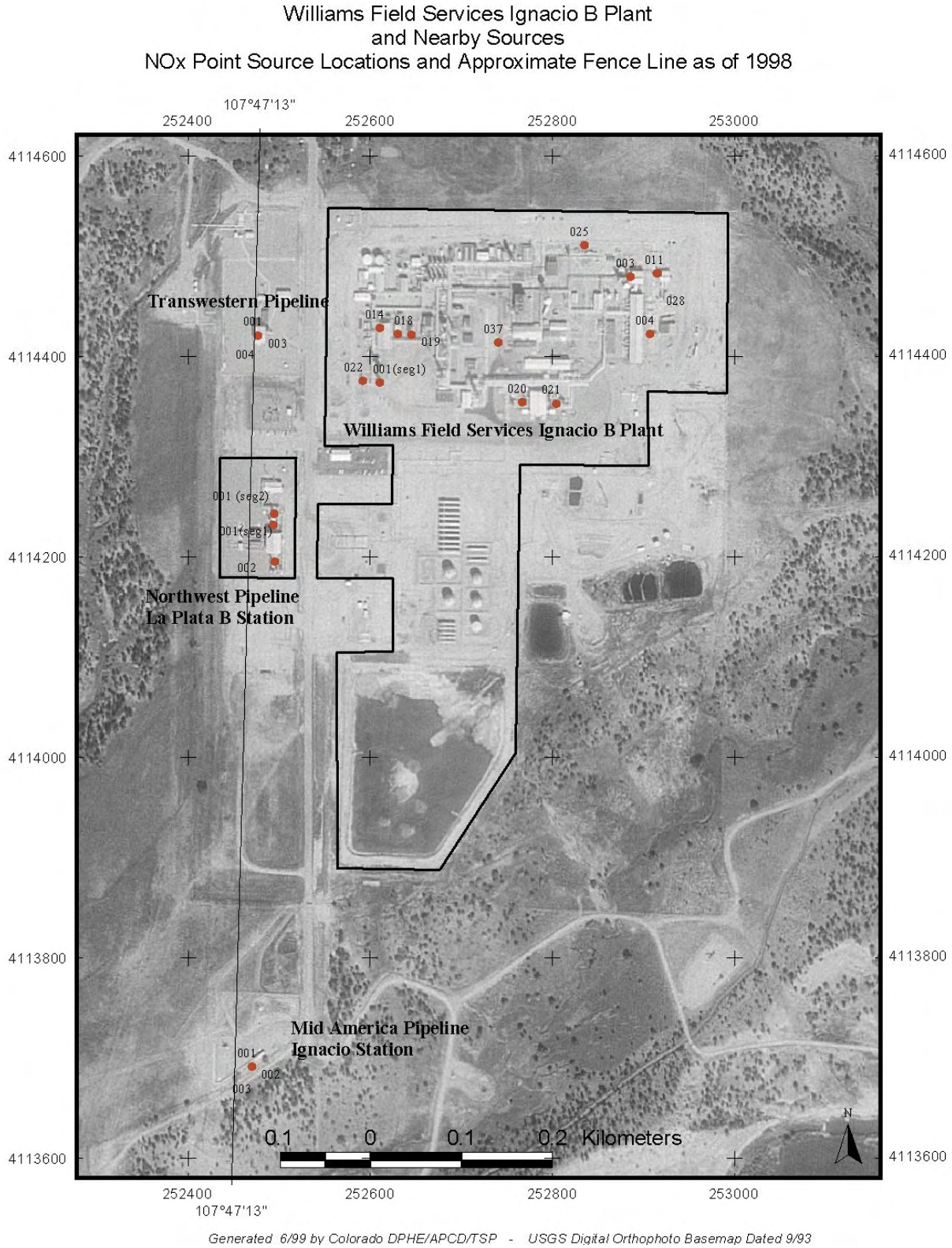


Figure 18. USGS DOQ showing facility locations.

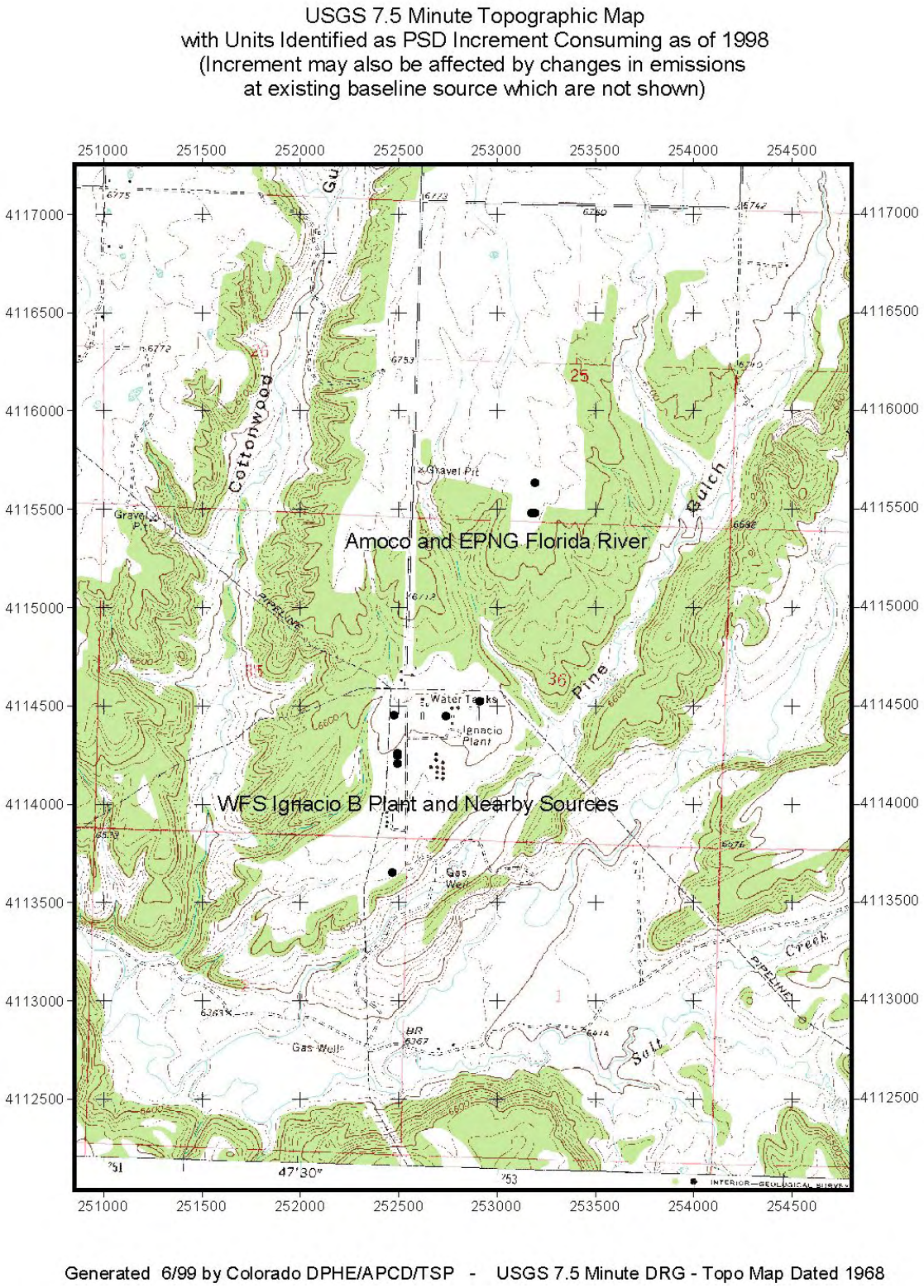


Figure 19. USGS 7.5 minute DRG showing facility locations.

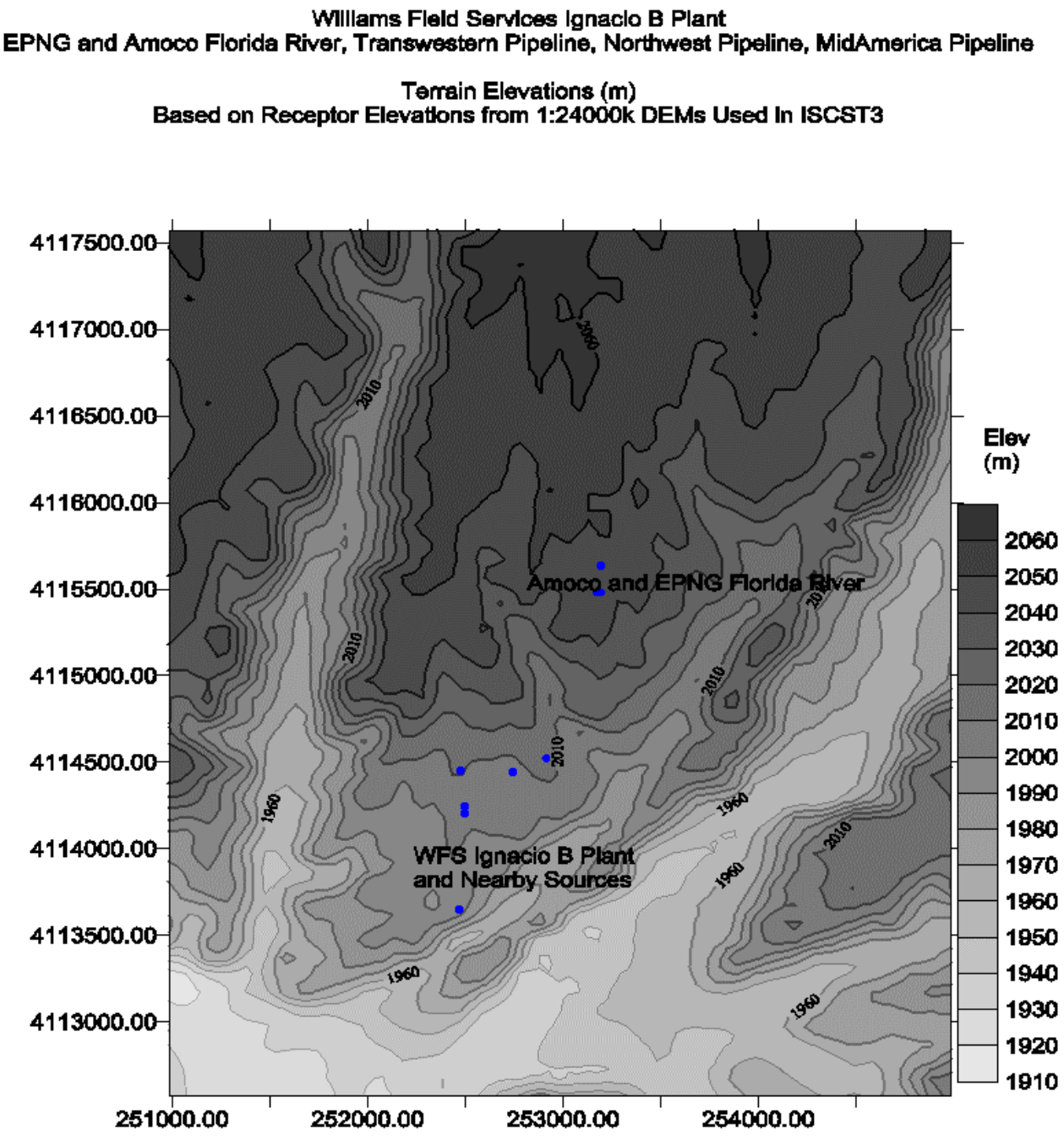


Figure 20. Terrain near the Ignacio B and Florida River facilities.

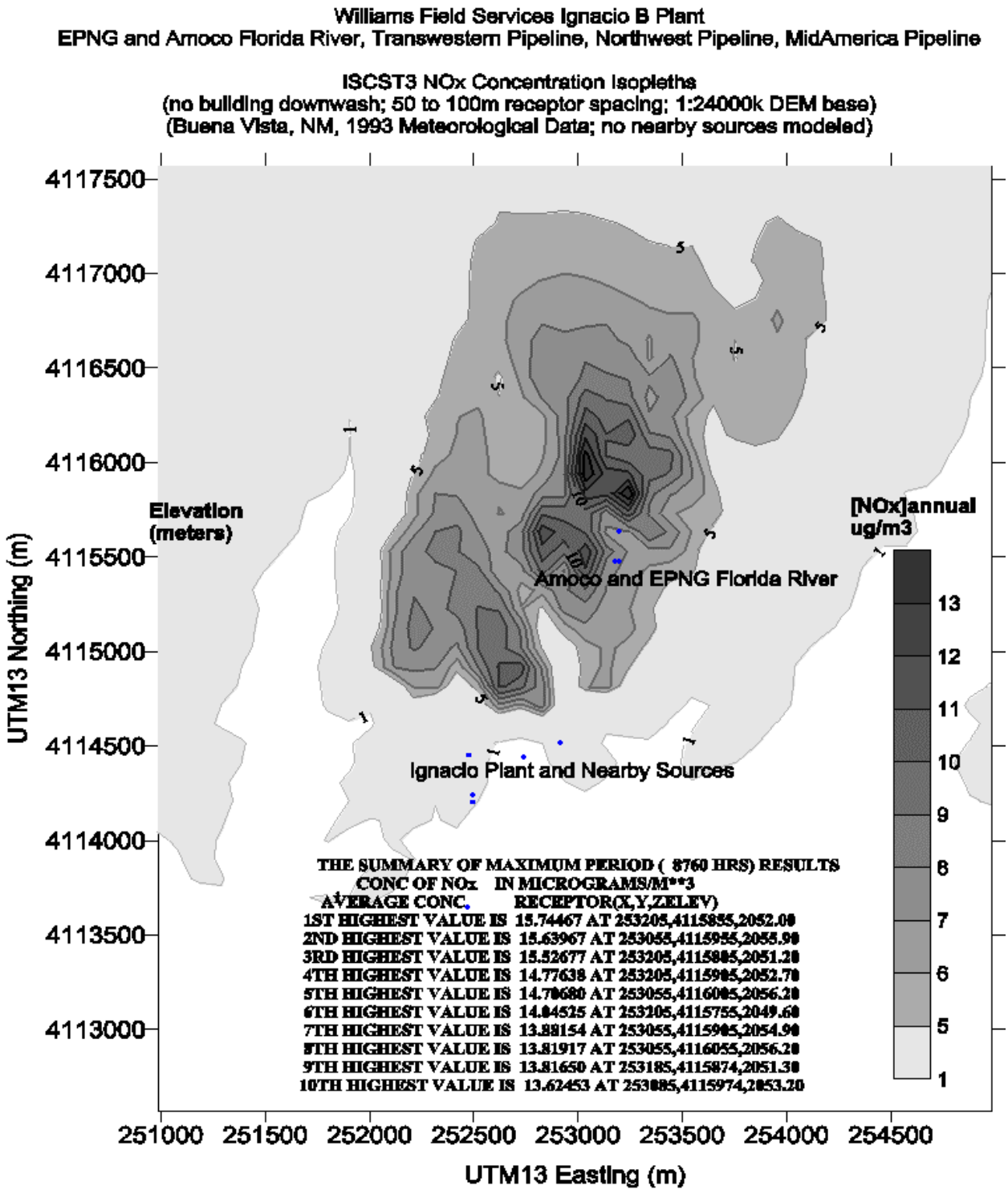


Figure 21. ISCST3 modeling results near the Ignacio B and Florida River facilities.

6.4. Emission Inventory

Table 11. WFS Ignacio B (SCSE 080670006) 1999 emission inventory.

TITLE:	**1999 Emission Inventory**												
Plant Name (PNME):	**WILLIAMS FIELD SVCS IGNACIO B PLANT**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
REGENERATION GAS HEATER	84LP109	REGENERATION GAS HEATER		-107.783889	37.145556	252611.23	4114401.22	670006a	0.000000	25.30	755.22	6.10	1.07
GE,MODEL M-3142, TURBINE	10LP076.GF	GE TURBINE 10,150 BHP	72249	-107.783889	37.145556	252885.85	4114516.85	670006b	3.689753	13.72	755.22	4.33	1.07
COMPRESSOR ENGINE	GF	(7) RECIP COMP ENGINES		-107.783889	37.145556	252907.71	4114454.47	670006c	28.660674	7.62	671.89	6.10	0.61
SOLAR TURBINE 2470BHP ENG	10LP076.CANC	SOLAR TURBINE 2,470 BHP		-107.783889	37.145556	252915.71	4114521.12	670006d	0.000000	5.49	755.22	6.10	0.79
(3)RECIP. I.C. ENGINES	86LP045	ENGINE FOR GENERATOR		-107.783889	37.145556	252611.28	4114460.87	670006e	2.641086	8.53	671.89	6.10	0.30
BOILER - NATGAS FIRED	BOILER NATURAL GAS FIRED	BOILER NATURAL GAS FIRED		-107.783889	37.145556	252630.47	4114454.47	670006f	0.217501	8.53	755.22	6.10	0.91
STEAM BOILER #3	STEAM BOILER NO 3	STEAM BOILER NO 3		-107.783889	37.145556	252645.93	4114453.94	670006g	0.209446	8.53	755.22	6.10	0.91
TURBINE #1-GE,SN: 282514	83LP248-2	TURBINE-NAT.GAS COMBUSTN		-107.783889	37.145556	252766.96	4114379.30	670006h	6.552652	13.72	727.44	40.78	1.83
TURBINE #2: GE,SN: 282515	83LP248-1	TURBINE #2- NAT.GAS COMB.		-107.783889	37.145556	252804.81	4114378.23	670006i	6.552652	13.72	727.44	40.78	1.83
REGENERATION HEATER	84LP109	REGENERATION HEATER	97150	-107.783889	37.145556	252592.62	4114402.76	670006j	0.325485	6.10	421.89	6.10	0.40
E. DEHYDRATOR GLYCOL RBLR	EAST DEHYDRATOR GLYCOL RB	EAST DEHYDRATOR GLYCOL RB		-107.783889	37.145556	252835.73	4114551.51	670006k	0.011508	4.27	866.33	6.10	0.24
GAS TURB SOLAR 34.81E6BTU	96LP237	NAT GAS		-107.783889	37.145556	252915.17	4114521.12	670006l	0.883241	9.14	703.56	52.49	0.98
S029 AMINE REGENERATOR	97LP0315	NATURAL GAS PROCESSED		-107.783889	37.145556	252740.83	4114444.88	670006m	0.605911	26.52	302.44	0.88	0.30
								total=	**50.34991**	**g/s =**	**1750.1**	**ton/yr**	

Key:
SCSE = Plant ID number XXYYYZZZZ where XX=FIPS State, YYY=FIPS County, ZZZZ=NEDS plant Number
PNME = Plant Name
DSC3 = Construction Permit Number
EPDS = Point Description
DSC4 = Segment Description
SD07 = Initial permit approval date [Julian date: YYDDD]
LATITUDE = latitude in decimal degrees
LONGITUDE = longitude in decimal degrees
UTM13E = Zone 13 Universal Tranverse Mercator (UTM) easting (meters)
(UTM 1927,Clarke 1866,Central Meridian=-105,Ref Latitude=0,False Easting=500000,False Northing=0
UTM13N = Zone 13 UTM Northing (meters)
NOX_gps = Estimated Actual Emission Rate as Reported on APEN (grams per second, long-term)
StkH_m = Stack Height (meters)
StkT_K = Stack Gas Exit Temperature (Kelvin)
StkV_mps = Stack Gas Exit Velocity (meters per second)
StkD_m = Stack Diameter (meters)

Table 12. WFS Ignacio B (SCSE 080670006) 1989 inventory and increment inventory.

TITLE:	**1989 Emission Inventory**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
REGENERATION GAS HEATER	84LP109	REGENERATION GAS HEATER		-107.783889	37.145556	252611.23	4114401.22	670006a	0.000000	25.30	755.22	6.10	1.07
GE,MODEL M-3142, TURBINE	10LP076.GF	GE TURBINE 10,150 BHP	72249	-107.783889	37.145556	252885.85	4114516.85	670006b	3.689753	13.72	755.22	4.33	1.07
COMPRESSOR ENGINE	GF	(7) RECIP COMP ENGINES		-107.783889	37.145556	252907.71	4114454.47	670006c	28.660674	7.62	671.89	6.10	0.61
SOLAR TURBINE 2470BHP ENG	10LP076.CANC	SOLAR TURBINE 2,470 BHP		-107.783889	37.145556	252915.71	4114521.12	670006d	0.000000	5.49	755.22	6.10	0.79
(3)RECIP. I.C. ENGINES	86LP045	ENGINE FOR GENERATOR		-107.783889	37.145556	252611.28	4114460.87	670006e	2.641086	8.53	671.89	6.10	0.30
BOILER - NATGAS FIRED	BOILER NATURAL GAS FIRED	BOILER NATURAL GAS FIRED		-107.783889	37.145556	252630.47	4114454.47	670006f	0.217501	8.53	755.22	6.10	0.91
STEAM BOILER #3	STEAM BOILER NO 3	STEAM BOILER NO 3		-107.783889	37.145556	252645.93	4114453.94	670006g	0.209446	8.53	755.22	6.10	0.91
TURBINE #1-GE,SN: 282514	83LP248-2	TURBINE-NAT.GAS COMBUSTN		-107.783889	37.145556	252766.96	4114379.30	670006h	6.552652	13.72	727.44	40.78	1.83
TURBINE #2: GE,SN: 282515	83LP248-1	TURBINE #2- NAT.GAS COMB.		-107.783889	37.145556	252804.81	4114378.23	670006i	6.552652	13.72	727.44	40.78	1.83
REGENERATION HEATER	84LP109	REGENERATION HEATER	97150	-107.783889	37.145556	252592.62	4114402.76	670006j	0.325485	6.10	421.89	6.10	0.40
E. DEHYDRATOR GLYCOL RBLR	EAST DEHYDRATOR GLYCOL RB	EAST DEHYDRATOR GLYCOL RB		-107.783889	37.145556	252835.73	4114551.51	670006k	0.011508	4.27	866.33	6.10	0.24
								total=	**48.86076**	**g/s =**	**1698.3**	**ton/yr**	

Note: The 1983 report "Air Permit Application for Proposed Modification of the Ignacio, Colorado Gasoline Plant (Supplement No. 1)" lists the following sources:

Source Description	Number of identical srcs	NOx (lbs/yr)
Electrical Generators	3	189
Rich Oil Heater	1	25
Regeneration Gas Heater	1	3
Steam Boiler No. 1	1	3
Steam Boiler No. 2	1	7
Steam Boiler No. 3	1	6
Recompressor Enginers	2	53
A Plant Compressor Engines	7	964
B Plant Turbine	1	112
C Plant Turbine	1	8.37
	TOTAL=	1371

TITLE:	**Change in Emissions Between 1989 and 1999 (positive emissions = increment consumption; negative = expansion)**												
	(positive emissions = increment consumption; negative emissions = increment expansion)												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
GAS TURB SOLAR 34.81E6BTU	96LP237	NAT GAS		-107.783889	37.145556	252915.17	4114521.12	670006l	0.883241	9.14	703.56	52.49	0.98
S029 AMINE REGENERATOR	97LP0315	NATURAL GAS PROCESSED		-107.783889	37.145556	252740.83	4114444.88	670006m	0.605911	26.52	302.44	0.88	0.30
								total=	**1.48915**	**g/s =**	**51.8**	**ton/yr**	

Note: Some units have had permits canceled and others may have had engines replaced. These activities may have expanded increment by retiring baseline units. These types of changes have not been quantified as part of this study. For example, srcid 670006a and 670006d have NOx actuals of 0.0 gps. Thus, there are probably retired baseline units.

7. Source-by-Source PSD Increment Analysis – Northwest Pipeline Association La Plata B Compressor Station (Scse 08670081)

7.1. Discussion

The Title V operating permit indicates that both units of NOx at this facility were installed after the minor source baseline date for nitrogen dioxide. These two units have been identified as increment consuming:

1) **Unit P001** - **Unit B001 .** Solar Taurus Natural Gas Fired Turbine, Rated at 5,100 Maximum Horsepower and 45.0 MMBtu/hr Maximum Design Heat Rate, Serial Number 0071T with Deltak Waste-Heat Boiler/ Coen Duct Burner, Model Delta 3S6-347-SE, Serial Number G92001A, rated at 14.4 MMBtu/hr in the Turbine Exhaust Gas Mode and 29.0 MMBtu/hr in the Fresh Air Firing Mode, maximum continuous heat rate;
2) **Unit P002** - **Unit B002.** Solar Taurus Natural Gas Fired Turbine, Rated at 5,100 Maximum Horsepower and 45.0 MMBtu/hr Maximum Design Heat Rate, Serial Number 0029T with Deltak Waste-Heat Boiler/ Coen Duct Burner, Model Delta 3S6-347-SE, Serial Number G92001B, rated at 14.4 MMBtu/hr in the Turbine Exhaust Gas Mode and 29.0 MMBtu/hr in the Fresh Air Firing Mode, maximum continuous heat rate

For modeling results, this source has been grouped with others at the Williams Field Service Ignacio B Plant and sources from the EPNG and Amoco Florida River Plants. This has been done because of the close proximity of the sources. Refer to the WFS Ignacio B section of this report for results.

7.2. Excerpts from "TECHNICAL REVIEW DOCUMENT FOR OPERATING PERMIT 95OPLP032," July 6, 1999 (draft)

Source Description:

This source is classified as a natural gas compression facility defined under Standard Industrial Classification 4922.

The La Plata B Compressor Station utilizes two Solar Taurus turbines to provide compression for Northwest Pipeline's mainline natural gas pipeline system. Emissions from these units are uncontrolled and vent to individual stacks. In addition, as needed, these turbines supply waste heat to two boilers that are supplementary fired by COEN

duct burners. Steam production is provided to the Ignacio Gas Processing Plant located adjacent to the compressor station. Auxiliary equipment at the compressor station includes metering equipment, comfort and process heating equipment, a standby generator, a water heater, several oil storage tanks with associated vents, and plant relief valves that vent to the atmosphere.

The facility is located within the boundary of the Southern Ute Reservation in a rural area southeast of Durango in La Plata County, Colorado, in an area designated as attainment for all criteria pollutants. New Mexico is designated as an affected state located within a 50 mile radius of the facility. Mesa Verde National Park and the Weminuche Wilderness Area are Federal Class I areas located within 100 kilometers of the facility. This source is considered to be part of the Williams Field Services Ignacio Gas Plant which is located adjacent to the La Plata B Compressor Station, because both facilities are owned by the same parent company. Since the Ignacio Gas Plant is a major source in terms of PSD requirements, the La Plata B Station is also considered to be major in terms of the PSD regulations. This interpretation is reinforced by the fact that the La Plata B turbines were originally permitted as a major modification to an existing major source (the Ignacio Gas Plant) and, as such, were subject to PSD review. The result of that PSD review was that the La Plata B turbines were required to install dry low NOx burners by November 1, 1998. The permit terms and conditions in effect with the dry low NOx burners installed are included in the Operating Permit. Based on the current burner emission factors, the facility-wide potential and actual emissions of the La Plata B Station are as follows:

Pollutant	Potential to Emit (tpy)	1994 Actual Emissions (tpy)
NOx	143.9	93.2 (same for 1999, based on most recent APEN)
VOC	13.7	4.1
CO	35.0	16.4

Potential emissions are taken from the revised construction permits for this facility. Actual emissions are taken from the most recent revised APENs that were included in the operating permit application and additional information submittals. The applicant certified, in an additional information submittal, that the facility was in compliance with all applicable requirements. The applicant also indicated that the facility is not subject to 112(r).

Emission Sources:
The following sources are specifically regulated under terms and conditions of the operating permit for this Site:

Unit P001 - Unit B001	**Solar Taurus Natural Gas Fired Turbine, Rated at 5,100 Maximum Horsepower and 45.0 MMBtu/hr Maximum Design Heat Rate, Serial Number 0071T with Deltak Waste-Heat Boiler/ Coen Duct Burner,**

Model Delta 3S6-347-SE, Serial Number G92001A, rated at 14.4 MMBtu/hr in the Turbine Exhaust Gas Mode and 29.0 MMBtu/hr in the Fresh Air Firing Mode, maximum continuous heat rate

Unit P002 - Unit B002 — **Solar Taurus Natural Gas Fired Turbine, Rated at 5,100 Maximum Horsepower and 45.0 MMBtu/hr Maximum Design Heat Rate, Serial Number 0029T with Deltak Waste-Heat Boiler/ Coen Duct Burner, Model Delta 3S6-347-SE, Serial Number G92001B, rated at 14.4 MMBtu/hr in the Turbine Exhaust Gas Mode and 29.0 MMBtu/hr in the Fresh Air Firing Mode, maximum continuous heat rate**

Discussion:

1. Applicable Requirements- Prior to Title V application submittal, Colorado Emission Permits 91LP792-1 and 91LP792-2, initially issued as PSD permits in May of 1992, defined applicable requirements for these turbine/duct burner units. As part of the application process, Northwest Pipeline proposed new emission limits based on manufacturer's emission factor data. Consequently, modifications to these permits were issued on November 4, 1996 to reflect emission limits consistent with the requested changes. The terms contained in the existing revised Construction Permits are as follows:

Parameter	Short Term Limit	Long Term Limit
NOx	18.0 lbs/hr	71.96 tons/yr
VOC	1.6 lbs/hr	6.83 tons/yr
CO	4.0 lbs/hr	17.52 tons/yr
PM_{10}	0.9 lbs/hr	3.82 tons/yr
Fuel Use	N/A	476.8 MMscf/yr

In addition to the mass emission limits listed above, the concentration of NOx in the exhaust gases was limited to 107 ppmvd (derived from a manufacturer's guarantee) at 15% O_2 and ISO standard day conditions. An additional requirement contained in these permits is that the standard combustor in each turbine was to be replaced by a dry low NOx combustor by November 1, 1998. At that time the concentration of NOx in the exhaust gases became limited to a concentration of 42 ppmvd at 15% O_2 and ISO standard day conditions.

As stated previously, none of the short term limits in the current Construction Permits were incorporated into the Operating Permit. The Regulation No. 1 particulate limit for

fuel burning equipment is the only short term limit included as an applicable requirement. The annual NOx, VOC, CO, PM_{10} and fuel use limitations and the 20% opacity limit are incorporated into the Operating Permit.

Construction Permits 91LP792-1 and -2 also established these turbines as being subject to NSPS Subpart GG, including limitations on the turbine exhaust gas NOx concentration and exhaust gas SO_2 concentration or the fuel sulfur content. The NOx limitation imposed by Subpart GG is less stringent than the ppmvd limit listed above and, thus, are not included in the Operating Permit as an applicable requirement. Subpart GG also requires that turbine fuel be analyzed for sulfur content and that the sulfur dioxide emissions cannot exceed 0.015% by volume at 15% O_2 on a dry basis and that the sulfur content of the fuel cannot exceed 0.8% by weight. Based on engineering judgement, the Division has determined that the exclusive use of natural gas as a fuel is sufficient to ensure compliance with these standards.

Each duct burner is subject to the provisions of NSPS Subpart Dc. The Division's analysis of the applicable requirements for these gas-fired units indicates that there are no emissions limits imposed by this Subpart. Therefore the daily fuel records required in 60.48c(h) and (I) do not have any regulatory impact. Subpart Dc is listed as an applicable requirement in the permit, but there are not be any standards, monitoring or recordkeeping requirements associated with the point.

2. Emission Factors- Emissions from each turbine/duct burner combination are produced during the combustion process, and are dependent upon various operating parameters and specific properties of the natural gas being burned. The pollutants of concern are nitrogen oxides (NOx), carbon monoxide (CO) and volatile organic compounds (VOCs). Small quantities of Hazardous Air Pollutants (HAPs) are also emitted when combustion is incomplete.

Each combined source consists of two unique emissions units that can be operated in various combinations, or modes, that generate different levels of emissions. The turbine can be operated by itself (turbine-only mode) or it can be operated with supplementary firing from the duct burner (turbine exhaust gas mode). In addition, the duct burner can be operated by itself (fresh air firing mode). Estimating emissions from each of these operating modes requires that different emission factors, or combinations of emission factors, be used in conjunction with the appropriate fuel use for each mode.

NOx, VOC, CO and PM_{10} emissions were calculated using emission factors derived from the hourly emission limits and hourly design heat input listed in the Construction Permit. These limits were based on vendor emission data provided by the applicant in an additional information submittal. Emissions generated by each turbine are estimated using the same emission factors for either turbine operating mode. Emissions generated by the duct burner are estimated using different emission factors for each of the two duct

burner operating modes. Detailed calculations demonstrating this derivation are provided in the attached Summary of Emission Factor Derivations. The derived emission factors are summarized in the table below. Because these factors are derived from existing Construction Permit emission limits, the Division finds them acceptable.

Turbine P001/P002 and Duct Burner B001/B002 Emission Factors

Pollutant	Turbine	Duct Burner, Turbine Exhaust Gas Mode	Duct Burner, Fresh Air Firing Mode
NOx	0.353 lb/MMBtu	0.090 lb/MMBtu	0.134 lb/MMBtu
CO	0.053 lb/MMBtu	0.111 lb/MMBtu	0.090 lb/MMBtu
VOC	0.021 lb/MMBtu	0.042 lb/MMBtu	0.031 lb/MMBtu
PM10	0.015 lb/MMBtu	0.014 lb/MMBtu	0.010 lb/MMBtu

7.3. Location Verfication with USGS Digital Orthophoto Quadrangles (DOQs) and Modeling Results

Facility locations and coordinates have been verified with USGS digital orthophoto quadrangles (DOQs). A DOQ is a computer-generated image of an aerial photograph in which displacements caused by terrain relief and camera tilts have been removed. It combines the image characteristics of a photograph with the geometric qualities of a map. In this case, unit specific coordinates have been digitized in ArcView by comparing the source locations on a plot plan with the orthophoto (see figure on the next page). In this case, the facility is shown on the Williams Field Services Ignacio B Plant image.

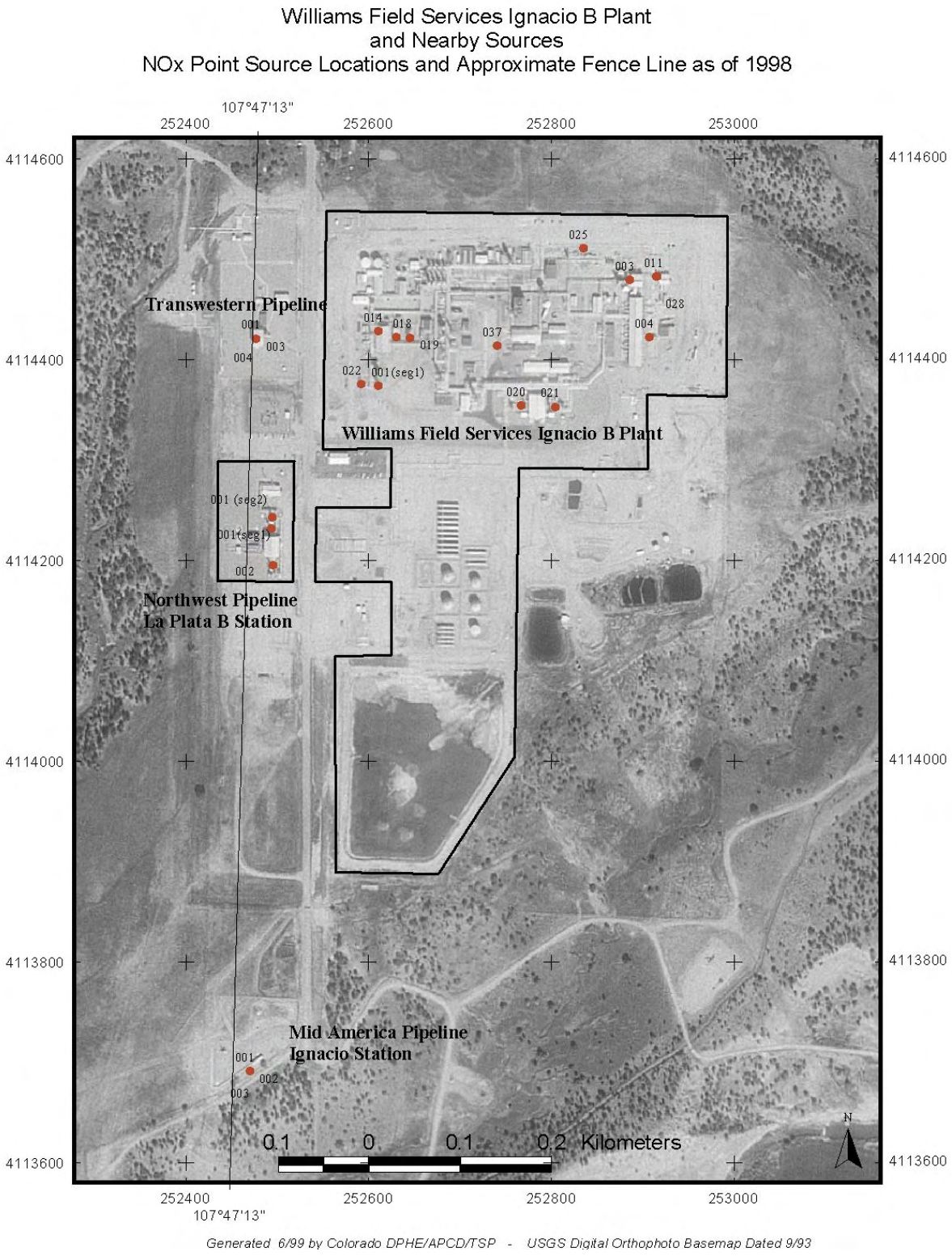


Figure 22. Location of La Plata B compressor station on a USGS DOQ.

7.4. Emission Inventory

Table 13. Northwest Pipeline La Plata B Station - emission inventories.

TITLE:	**1999 Emission Inventory**												
Source ID (SCSE):	**80670081**												
Plant Name PNME):	**Northwest Pipeline Corp La Plata B**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
SOLAR TAURUS TURBINE #1	91LP792-1	TURBINE #1/DUCT BURNER	96308	-107.786944	37.143889	252494.23	4114244.48	670081a	1.403976	15.24	449.67	30.48	1.07
SOLAR TAURUS TURBINE #2	91LP792-2	TURBINE #2 SOLAR TAURUS	96308	-107.786944	37.143889	252495.40	4114204.39	670081c	1.276813	15.24	449.67	30.48	1.07
								total=	**2.68079**	**g/s =**	**93.18**	**ton/yr**	
TITLE:	**1989 Emission Inventory**												
	This source did not exist in 1989.												
TITLE:	**Change in Actual Emissions Between 1989 and 1999 (positive emissions = increment consumption; negative = increment expansion)**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
SOLAR TAURUS TURBINE #1	91LP792-1	TURBINE #1/DUCT BURNER	96308	-107.786944	37.143889	252494.23	4114244.48	670081a	1.403976	15.24	449.67	30.48	1.07
SOLAR TAURUS TURBINE #2	91LP792-2	TURBINE #2 SOLAR TAURUS	96308	-107.786944	37.143889	252495.40	4114204.39	670081c	1.276813	15.24	449.67	30.48	1.07
								total=	**2.68079**	**g/s =**	**93.18**	**ton/yr**	

Key:
SCSE = Plant ID number XXYYYZZZZ where XX=FIPS State, YYY=FIPS County, ZZZZ=NEDS plant Number
PNME = Plant Name
DSC3 = Construction Permit Number
EPDS = Point Description
DSC4 = Segment Description
SD07 = Initial permit approval date [Julian date: YYDDD]
LATITUDE = latitude in decimal degrees
LONGITUDE = longitude in decimal degrees
UTM13E = Zone 13 Universal Tranverse Mercator (UTM) easting (meters)
(UTM 1927,Clarke 1866,Central Meridian=-105,Ref Latitude=0,False Easting=500000,False Northing=0
UTM13N = Zone 13 UTM Northing (meters)
NOX_gps = Estimated Actual Emission Rate as Reported on APEN (grams per second, long-term)
StkH_m = Stack Height (meters)
StkT_K = Stack Gas Exit Temperature (Kelvin)
StkV_mps = Stack Gas Exit Velocity (meters per second)
StkD_m = Stack Diameter (meters)

8. Source-by-Source PSD Increment Analysis – Transwestern Pipeline Co. (Scse 08670109)

8.1. Discussion

The permit (90LP050) for AIRS unit 001 (SOLAR CENTAUR 50-HSN 0026) has been canceled. Since it is dated after the minor source baseline date. This unit is considered to be retired increment consuming source. As such, its emission rate is set to zero. It neither consumes nor expands increment.

AIRS units 3 (TO2 SOLAR CENTAUR 60T700S) and 4 (SOLAR CENTAUR 50H,SN:0026) have permit approval dates after the minor source baseline date. Thus, both are considered to be increment consuming units in this study.

For modeling results, this source has been grouped with others at the Williams Field Service Ignacio B Plant and sources from the EPNG and Amoco Florida River Plants. This has been done because of the close proximity of the sources. Refer to the WFS Ignacio B section of this report for results.

8.2. Location Verfication with USGS Digital Orthophoto Quadrangles (DOQs) and Modeling Results

Facility locations and coordinates have been verified with USGS digital orthophoto quadrangles (DOQs). A DOQ is a computer-generated image of an aerial photograph in which displacements caused by terrain relief and camera tilts have been removed. It combines the image characteristics of a photograph with the geometric qualities of a map. In this case, unit specific coordinates have been digitized in ArcView by comparing the source locations on a plot plan with the orthophoto (see figure on the next page). In this case, the facility is shown on the Williams Field Services Ignacio B Plant image.

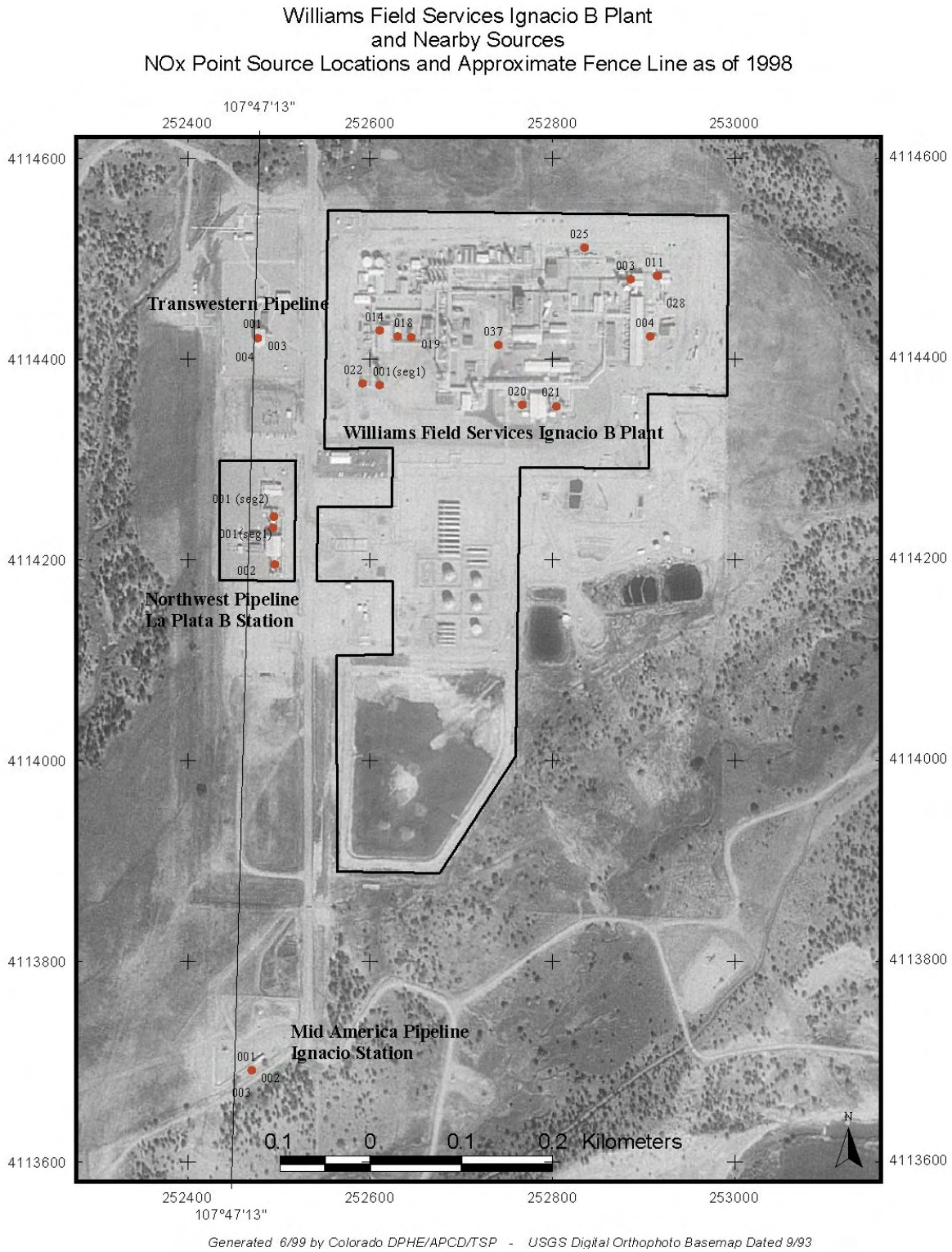


Figure 23. Location of the Transwestern Pipeline facility on a USGS DOQ.

8.3. Emission Inventory

Table 14. Transwestern Pipeline (SCSE 080670109) emission inventories.

TITLE:	**1999 Emission Inventory**												
Source ID (SCSE):	**80670109**												
Plant Name (PNME):	**TRANSWESTERN PIPELINE CO.**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
SOLAR CENTAUR 50-HSN 0026	90LP050.CANC	TURBINE COMPRESSOR	96156	-107.786944	37.145556	252477.40	4114452.85	670109a	0.000000	8.84	798.56	30.48	1.01
TO2 SOLAR CENTAUR 60T700S	97LP0653	T02 SOLARCENTAUR 60T7000S	97342	-107.786944	37.145556	252477.40	4114452.85	670109b	0.558713	13.72	743.56	14.94	1.00
SOLAR CENTAUR 50H,SN:0026	97LP0885	NAT.GAS		-107.786944	37.145556	252477.40	4114452.85	670109c	0.914885	13.72	769.11	6.10	1.01
								total=	**1.47360**	**g/s =**	**51.22**	**ton/yr**	

Key:
SCSE = Plant ID number XXYYYZZZZ where XX=FIPS State, YYY=FIPS County, ZZZZ=NEDS plant Number
PNME = Plant Name
DSC3 = Construction Permit Number
EPDS = Point Description
DSC4 = Segment Description
SD07 = Initial permit approval date [Julian date: YYDDD]
LATITUDE = latitude in decimal degrees
LONGITUDE = longitude in decimal degrees
UTM13E = Zone 13 Universal Tranverse Mercator (UTM) easting (meters)
(UTM 1927,Clarke 1866,Central Meridian=-105,Ref Latitude=0,False Easting=500000,False Northing=0
UTM13N = Zone 13 UTM Northing (meters)
NOX_gps = Estimated Actual Emission Rate as Reported on APEN (grams per second, long-term)
StkH_m = Stack Height (meters)
StkT_K = Stack Gas Exit Temperature (Kelvin)
StkV_mps = Stack Gas Exit Velocity (meters per second)
StkD_m = Stack Diameter (meters)

TITLE:	**1989 Emission Inventory**												
Source ID (SCSE):	**80670054**												
Plant Name (PNME):	**TRANSWESTERN PIPELINE CO.**												
This source did not exist in 1989.													

TITLE:	**Change in Actual Emissions Between 1989 and 1999 (positive emissions = increment consumption; negative = increment expansion)**												
Source ID (SCSE):	**80670054**												
Plant Name (PNME):	**TRANSWESTERN PIPELINE CO.**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
SOLAR CENTAUR 50-HSN 0026	90LP050.CANC	TURBINE COMPRESSOR	96156	-107.786944	37.145556	252477.4	4114452.85	670109a	0.000000	8.84	798.56	30.48	1.01
TO2 SOLAR CENTAUR 60T700S	97LP0653	T02 SOLARCENTAUR 60T7000S	97342	-107.786944	37.145556	252477.4	4114452.85	670109b	0.558713	13.72	743.56	14.94	1.00
SOLAR CENTAUR 50H,SN:0026	97LP0885	NAT.GAS		-107.786944	37.145556	252477.4	4114452.85	670109c	0.914885	13.72	769.11	6.10	1.01
								total=	**1.47360**	**g/s =**	**51.22**	**ton/yr**	

9. Source-by-Source PSD Increment Analysis – Mid America Pipeline Co. Ignacio Station (Scse 08670102)

9.1. Discussion

AIRS units 001, 002, and 003 (all for Saturn T-1300 turbines) have permit approval dates after the minor source baseline date. Thus, all three are considered to be increment consuming units in this study.

For modeling results, this source has been grouped with others at the Williams Field Service Ignacio B Plant and sources from the EPNG and Amoco Florida River Plants. This has been done because of the close proximity of the sources. Refer to the WFS Ignacio B section of this report for results.

9.2. Location Verification with USGS Digital Orthophoto Quadrangles (DOQs) and Modeling Results

Facility locations and coordinates have been verified with USGS digital orthophoto quadrangles (DOQs). A DOQ is a computer-generated image of an aerial photograph in which displacements caused by terrain relief and camera tilts have been removed. It combines the image characteristics of a photograph with the geometric qualities of a map. In this case, unit specific coordinates have been digitized in ArcView by comparing the source locations on a plot plan with the orthophoto (see figure on the next page). In this case, the facility is shown on the Williams Field Services Ignacio B Plant image.

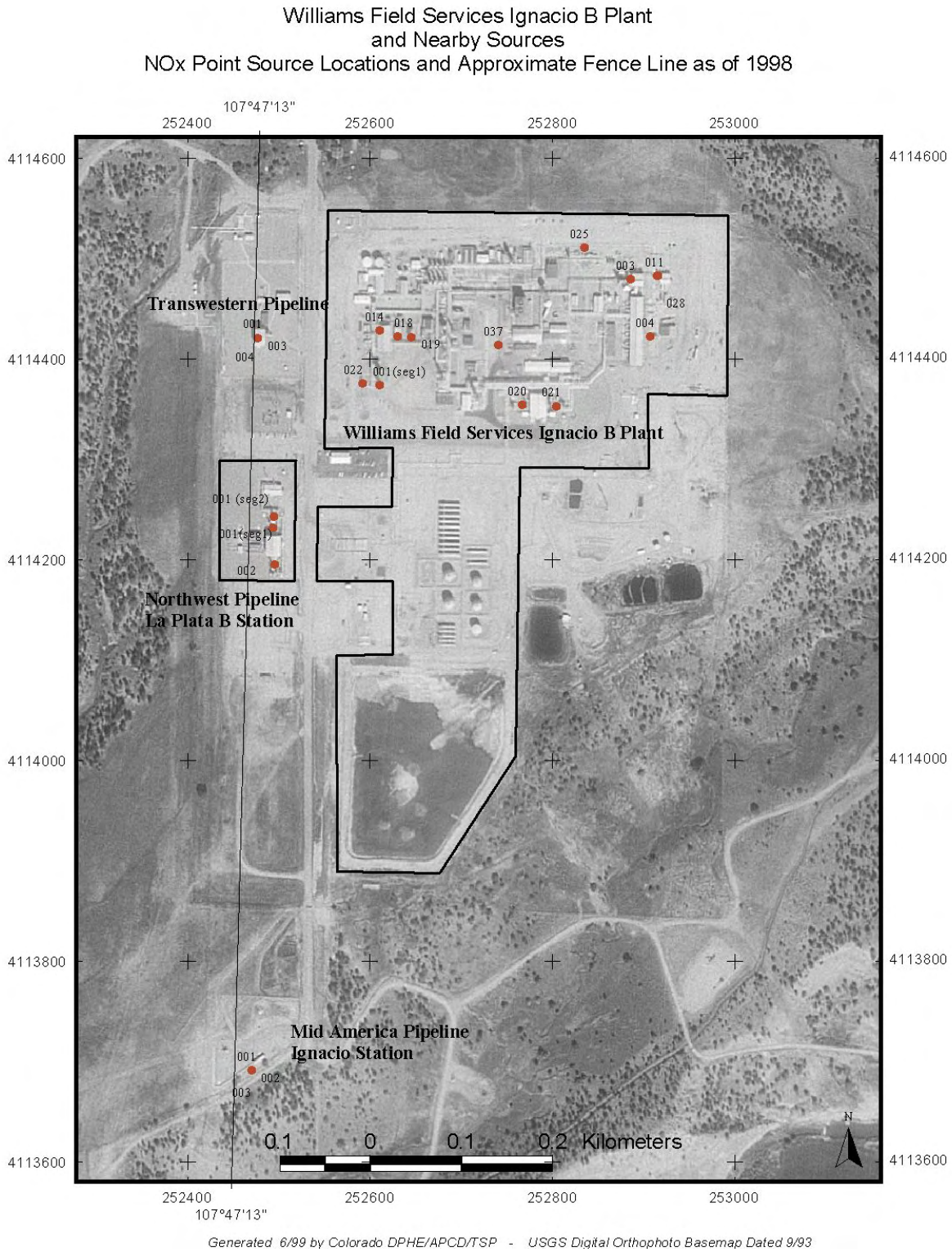


Figure 24. Location of the Mid America Pipeline Ignacio Station on a USGS DOQ.

9.3. Emission Inventory

Table 15. Mid America Pipeline Ignacio (SCSE 080670102) emission inventories.

TITLE:	**1999 Emission Inventory**												
Source ID (SCSE):	**80670102**												
Plant Name (PNME):	**MID AMERICA PIPELINE CO IGNACIO STA**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
SATURN T-1300 TURBINE #1	93LP209-1	SATURN T-1300 TURBINE #1	93230	-107.786667	37.138333	252470.49	4113650.60	670102a	0.469494	7.01	764.67	80.62	0.46
SATURN T-1300 TURBINE #2	93LP209-2	SATURN T-1300 TURBINE #2	93230	-107.786667	37.138333	252470.49	4113650.60	670102b	0.469496	7.01	764.67	80.62	0.46
SATURN T-1300 TURBINE #3	93DP210 (1-3)	SATURN T-1300 TURBINE #3	93230	-107.786667	37.138333	252470.49	4113650.60	670102c	0.469494	7.01	764.67	80.62	0.46
								total=	**1.40848**	**g/s =**	**48.96**	**ton/yr**	

Key:
SCSE = Plant ID number XXYYYZZZZ where XX=FIPS State, YYY=FIPS County, ZZZZ=NEDS plant Number
PNME = Plant Name
DSC3 = Construction Permit Number
EPDS = Point Description
DSC4 = Segment Description
SD07 = Initial permit approval date [Julian date: YYDDD]
LATITUDE = latitude in decimal degrees
LONGITUDE = longitude in decimal degrees
UTM13E = Zone 13 Universal Tranverse Mercator (UTM) easting (meters)
(UTM 1927,Clarke 1866,Central Meridian=-105,Ref Latitude=0,False Easting=500000,False Northing=0
UTM13N = Zone 13 UTM Northing (meters)
NOX_gps = Estimated Actual Emission Rate as Reported on APEN (grams per second, long-term)
StkH_m = Stack Height (meters)
StkT_K = Stack Gas Exit Temperature (Kelvin)
StkV_mps = Stack Gas Exit Velocity (meters per second)
StkD_m = Stack Diameter (meters)

TITLE:	**1989 Emission Inventory**												
Source ID (SCSE):	**80670102**												
Plant Name (PNME):	**MID AMERICA PIPELINE CO IGNACIO STA**												
This source did not exist in 1989.													

TITLE:	**Change in Actual Emissions Between 1989 and 1999 (positive emissions = increment consumption; negative = increment expansion)**												
Source ID (SCSE):	**80670102**												
Plant Name (PNME):	**MID AMERICA PIPELINE CO IGNACIO STA**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
SATURN T-1300 TURBINE #1	93LP209-1	SATURN T-1300 TURBINE #1	93230	-107.786667	37.138333	252470.49	4113650.60	670102a	0.469494	7.01	764.67	80.62	0.46
SATURN T-1300 TURBINE #2	93LP209-2	SATURN T-1300 TURBINE #2	93230	-107.786667	37.138333	252470.49	4113650.60	670102b	0.469496	7.01	764.67	80.62	0.46
SATURN T-1300 TURBINE #3	93DP210 (1-3)	SATURN T-1300 TURBINE #3	93230	-107.786667	37.138333	252470.49	4113650.60	670102c	0.469494	7.01	764.67	80.62	0.46
								total=	**1.40848**	**g/s =**	**48.96**	**ton/yr**	

10. Source-by-Source PSD Increment Analysis – El Paso Natural Gas Company Bondad Compressor Station (Scse 08670018)

10.1. Discussion

The Title V operating permit indicates that 2 Solar Centaur T-3002R natural gas-fired turbines (S001a and S002a) were installed before the minor source baseline date. A similar third unit (S003a) was permitted after the minor source baseline date. Thus, units S001a and S002a are baseline units while S003a is increment consuming for nitrogen dioxide. In December 1998 a minor modification application was received to replace the above units with three Solar Centaur 40-T5300L turbines. All three of the new units consume PSD increment. Since unit S003a was already increment consuming and it was not a baseline source, its retired emissions are set to zero. The emissions from the retired baseline units S001a and S002a expand increment since they were in existence before the minor source baseline date.

ISCST3 modeling by the Division using a 100% conversion of NO to NO_2 suggests there are no violations of the Class II increment near this facility in "ambient air." The maximum annual nitrogen oxides (NOx) impact at the fenceline in ambient air from this source alone is 5.4 $\mu g/m^3$, without considering the cumulative impact from nearby sources. Assuming that 75 percent of the emitted NOx exists as NO_2 in the atmosphere in the near-field, the maximum nitrogen dioxide concentration of 4.0 $\mu g/m^3$, which is well below the Class II PSD increment of 25 $\mu g/m^3$. Building downwash has been used in this case. Building dimensions and height were approximated based on the plot plan and aerial photographs.

The Florida 1988 meteorological data set was used. It may not be representative of conditions at the site; nevertheless, it should provide a reasonable estimate of maxima.

10.2. Excerpts from "TECHNICAL REVIEW DOCUMENT FOR OPERATING PERMIT 95OPLP030," Last Revised January 22, 1999

Source Description
This facility is a natural gas compressor station. Natural gas is transported to the station by way of a high-pressure pipeline. Three natural gas fired turbines recompress the natural gas for transportation further down the pipeline. Southeast Quadrant of Section 13, T33N, R9W. It is approximately 14 miles south, southwest of the city of Durango

and approximately 7 miles northeast of the town of Bondad, Colorado. The nearest major road is County Road 318. This facility is located on fee lands within the exterior boundaries of the Southern Ute Indian Reservation. The nearest major road is County Road 307. La Plata county is designated as attainment for all criteria pollutants. The state of New Mexico is within a 50 mile radius of the facility. Additionally, two Federal Class I areas, Mesa Verde National Park and Weminuche Wilderness Area, are located within 100 Kilometers of the facility. The facility has certified that they are not subject to the Accidental Release provisions of section 112(r) of the Clean Air Act.

The source is considered to be a minor source (Potential To Emit (PTE) < 250 Tons Per Year (TPY)) for purposes of the Prevention of Significant Deterioration (PSD) program. Facility wide emissions are as follows:

Potential To Emit (TPY)				
Pollutant	95OPLP030 Issued 09/01/98		95OPLP030	Net Change (TPY)
	Current	After Turbine Upgrade	Proposed Modification	
NOx	241.2	244.2	Same	0.0
CO	78.7	68.4	Same	0.0
VOC	1.4	2.4	Same	0.0

Potential emissions from the 09/01/98 operating permit were based upon Colorado Construction Permit limitations. Potential emissions for this modification are based upon the minor modification application dated 12/08/98. Emissions of SO_2, PM, and PM_{10} are negligible from the equipment at this facility. There are no changes in potential emissions as a result of this modification

Modification

Incorporation of Standard Alternative Operating Scenario Engine Replacement Language

a. Emission Permits - All current and future (as described in the Sect. I, Cond. 2.1 of the operating permit) emission limitations are in effect with this modification. Also all current monitoring requirements are unchanged.

b. Applicable Requirements Discussion- Since there were no emissions increases associated with this modification, no additional control measures are required. The applicable requirements listed in the current permit remain in effect.

c. Emission Factors - The current emission factors in the issued Operating Permit remain in effect.

10.3. Excerpts from "TECHNICAL REVIEW DOCUMENT FOR OPERATING PERMIT 95OPLP030," Last Revised June 18, 1999

Source Description
Facility wide emissions as follows:

	Current	After Turbine Replacement	
Pollutant	PTE (tpy)	PTE (tpy)	Actual (tpy)
NOx	241.2	244.2	244.2
VOC	1.4	2.4	2.4
CO	78.7	68.4	68.4
SO_2	0.23		0.19

The facility is a true PSD minor for NOx and is permitted at maximum potential emissions. Potential emissions are based on emissions calculations supplied in the operating permit application and existing construction permits for the regulated units covered by the Operating Permit. Actual emissions are based upon information supplied in the operating permit application. This facility is required to provide an updated APEN in the event that emissions of NOx increase 5% or 50 tons per year and/or CO or VOC increase 5 tons per year above the level reported on the last APEN submitted to the APCD. Under the guidelines of EPA's Whitepaper for streamlining the operating permit process, actual emissions for the last data year were not required during the application process. Therefore, the Division assumes that emissions from this facility have remained the same or decreased since the last APEN submittal based upon the compliance certification in the operating permit application.

Emission Sources:
The following sources are specifically regulated under terms and conditions of the Operating Permit for this Site:

Units S001a & S002a - Solar Centaur T-3002R Regenerative Natural Gas Fired Turbines, S/N: 1689C4R & 1668C4R, Site Rated at 2360 Horsepower Each.

Discussion:
1. Applicable Requirements- S001a and S002a were issued initial approval permit numbers C-12, 781 (1-2) on October 6, 1980. The permits were amended on November 26, 1980 and final approval was granted on August 11, 1982. The final approval permits were later modified on April 4, 1997.

The following terms and conditions of the Construction Permits have been incorporated into the Draft Operating Permit as Applicable Requirements: Annual emission limits for NOx, CO, and fuel use limitations; 20% Opacity limit; General and specific provisions of New Source Performance Standards (NSPS) Subpart GG - Standards of Performance for Stationary Gas Turbines, including SO limitations in parts per million. The VOC limitations from the final approval permit were dropped as actual uncontrolled emissions were below deminimis levels. Additionally, limitations for particulate matter (PM) and particulate matter under 10 microns (PM10) were dropped as applicable requirements as

they are below the 2 TPY APEN de minimis level stated in Regulation No. 3, Part A. While AP-42 estimates these emissions to be much higher (Table 3.1-1), it should be noted that the emission factor has a rating of "E" and should only be used when no other data is available.

The following short-term limits have been removed from the Operating Permit per the guidance in paragraph two (2) of this document: pound per hour NOx emissions; pound per hour CO emissions; and scf per hour fuel consumption. The turbines are required to meet a sulfur dioxide (SO2) standard of 150 PPMVD, as well as a fuel sulfur content of 0.8% by weight. Because the units are burning natural gas, both of these should easily be met. It should be noted that NSPS GG also requires monitoring of the nitrogen content of the fuel to determine fuel-bound nitrogen allowances. However, the source is claiming no nitrogen allowances under 60.332(a)(1), and therefore monitoring is not needed.

2. Emission Factors- Emissions from a turbine are produced during the combustion process, and are dependent upon the turbine load, combustor design, ambient temperature, air-to-fuel ratio, the specific properties of the natural gas being burned and other factors. The pollutants of concern are Nitrogen Oxides (NOx), Carbon Monoxide (CO) and Volatile Organic Compounds (VOC). Small quantities of Hazardous Air Pollutants (HAPs) and Particulate Matter (PM and PM under 10 microns) are also emitted due to incomplete combustion. The emission factors used are based upon testing performed on Solar turbines at Bondad. The turbines were tested at high, medium, and low loads. Worst case emissions in lbs/hr were used to derive emission factors with units of lbs/mmBTU. For NOx this represented the high load while the worst case CO emissions were found at low load. The fuel rate for a chosen load along with a source given fuel heat content of 936 Btu/Scf were used to make the conversions. The emission factors used are listed below:

Pollutant	Emission Factor (lbs/mmBTU)	AP-42 (lbs/mmBTU)
NOx	0.63	0.34
CO	0.58	0.17

Units S003a - Solar Centaur T-3002R Regenerative Natural Gas Fired Turbine, S/N: 4396C, Site Rated at 2360 Horsepower.

Discussion:
1. Applicable Requirements- This unit was issued initial approval permit number 90LP125 on January 23, 1991. The permit was modified on June 18, 1992. Final approval was granted on July 18, 1995.

The applicable requirements for S001a and S002b, albeit with different limitations, also apply to S003a. Please see discussion under S001a - S002a.
The following short term limits have been removed from the Operating Permit per the guidance in paragraph two (2) of this document: pound per hour NOx emissions; pound per hour CO emissions; and scf per hour fuel consumption.

2. Emission Factors- As with S001a - S002a, the emission factors used are based upon testing performed on the Solar turbine at the Bondad site and were calculated as discussed above. The emission factors used were:

Pollutant	Emission Factor (lbs/mmBTU)	AP-42 (lb/mmBTU)
NOx	0.62	0.34
CO	0.58	0.17

Units S001b, S002b & S003b - Solar Centaur 40-T5300L Natural Gas Fired Turbines, S/N: TBP, Site Rated at 5300
Horsepower Each (ISO Conditions and 37.04 MMBTU/HR).

Discussion:
1. Applicable Requirements- S001b, S002b and S003b are designated to replace the turbines described under S001a, S002a and S003a. Construction permit #97LP0803 was issued on April 22, 1998 as an initial approval.

The following terms and conditions of the Construction Permits have been incorporated into the Draft Operating Permit as Applicable Requirements: Annual emission limits for NOx, CO, VOCs and fuel use limitations; 20% Opacity limit; General and specific provisions of New Source Performance Standards (NSPS) Subpart GG - Standards of Performance for Stationary Gas Turbines, including SO limitations in parts per million. No limitations for particulate matter (PM) and particulate matter under 10 microns (PM10) were included as they are estimated to be below the 2 TPY de minimis level stated in Regulation No. 3, Part A.

The following short-term limits have been removed from the Operating Permit per the guidance in paragraph two (2) of this document: pound per hour NOx emissions; pound per hour CO emissions; and scf per hour fuel consumption. The turbines are required to meet a sulfur dioxide (SO) standard of 150 PPMVD, as well as a fuel sulfur content of 0.8% by weight. Because the units are burning pipeline quality natural gas, both of these should easily be met. It should be noted that NSPS GG also requires monitoring of the nitrogen content of the fuel to determine fuel-bound nitrogen allowances. However, the source is claiming no nitrogen allowances under 60.332(a)(1), and therefore monitoring is not needed.

2. Emission Factors- Emissions from a turbine are produced during the combustion process, and are dependent upon the turbine load, combustor design, ambient temperature, air-to-fuel ratio, the specific properties of the natural gas being burned and other factors. The pollutants of concern are Nitrogen Oxides (NOx), Carbon Monoxide (CO) and Volatile Organic Compounds (VOC). Small quantities of Hazardous Air Pollutants (HAPs) and Particulate Matter (PM and PM under 10 microns) are also emitted due to the incomplete nature of combustion. The emission factors used are from the manufacturer, Solar. For CO the source chose to use the manufacturers values with a correction allowance for the increase in CO emissions with decreasing ambient

temperature. The fuel heating value used for emission factor conversions was 914.4 Btu/Scf. The emission factors used are listed below:

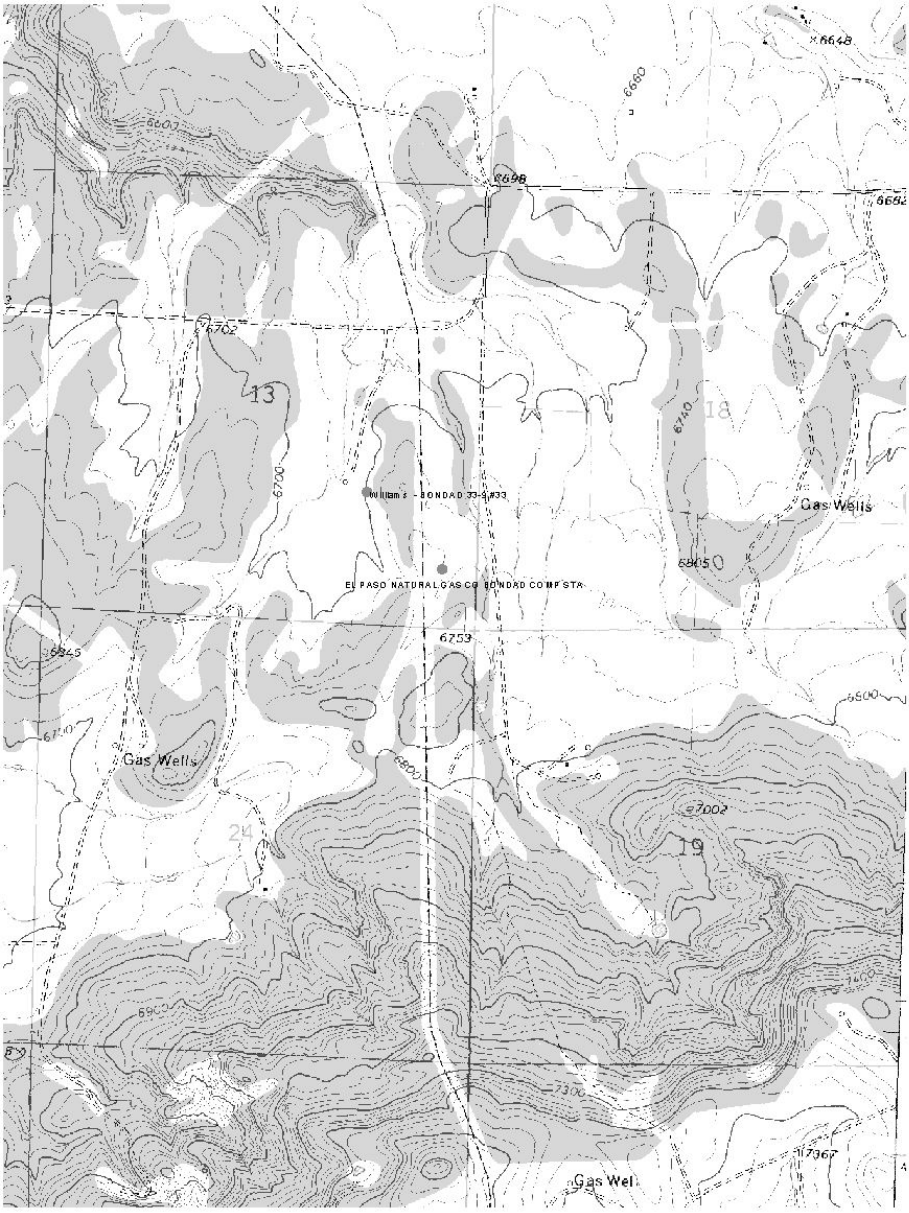
Pollutant	Emission Factor (lbs/mmBTU)	AP-42 (lb/mmBTU)
NOx	0.50	0.34
VOC	0.005	0.002
CO	0.14	0.17

10.4. Location Verfication with USGS Digital Orthophoto Quadrangles (DOQs) and Modeling Results

Facility locations and coordinates have been verified with USGS digital orthophoto quadrangles (DOQs). A DOQ is a computer-generated image of an aerial photograph in which displacements caused by terrain relief and camera tilts have been removed. It combines the image characteristics of a photograph with the geometric qualities of a map. In this case, unit specific coordinates have been digitized in ArcView by comparing the source locations on a plot plan with the orthophoto (see figure on the next page). In this case, the facility is shown on the Williams Field Services Ignacio B Plant image.

Figure 25. Location of the EPNG Bondad facility on a USGS DOQ.

USGS 7.5 Minute Topographic Map
EPNG Bondad Compressor Station
and Nearby Sources



Generated by Colorado DPHE/APCD/TSP 7/1999 bondad.apr

Figure 26. Location of the EPNG Bondad site and nearby sources on a USGS 7.5 minute DRG.

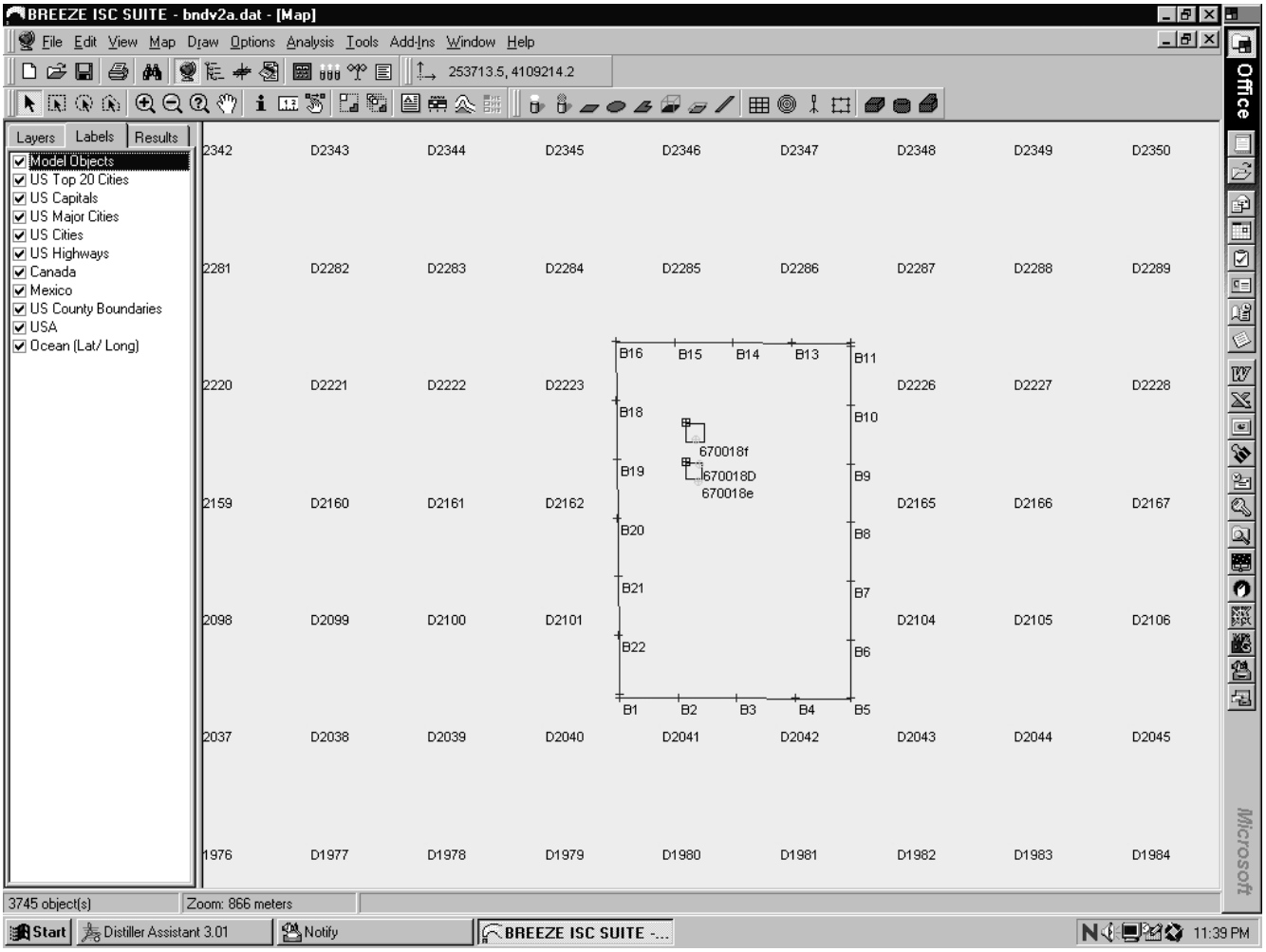


Figure 27. ISCST3 source and receptor configuration for the EPNG Bondad facility.

10.5. Emission Inventory

Table 16. EPNG Bondad emission inventories.

TITLE:	**1999 Emission Inventory**													
Source ID (SCSE):	**80670018**													
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	KEY	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
(3) CENTAUR 40-T5300L	97LP0803	(3) CENTAUR 40-T5300L	98112	-107.769167	37.098056	0806700180071	253874.93876	4109145.89941	670018d	6.723549	10.36	716.89	0.58	1.22
									total=	**6.72355**	**g/s =**	**233.70**	**ton/yr**	
TITLE:	**1989 Emission Inventory**													
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	KEY	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
SOLAR T3000 SN:8009663R91	12LP781-1	SOLAR T3000	80330	-107.769167	37.098056	0806700180011	253881.43868	4109129.84031	670018a	0.940779	8.23	602.44	12.01	1.83
SOLAR T-3000 SN:1668C4R	12LP781-2	SOLAR T3000	80330	-107.769167	37.098056	0806700180021	253882.58519	4109148.19358	670018b	0.940779	8.23	602.44	12.07	1.83
									total=	**1.88156**	**g/s =**	**65.40**	**ton/yr**	

Note that the stack velocity for the T5300L turbines is listed in AIRS at 0.58 m/s. This appears much to low for this type of unit. Thus, in the hot spot modeling a value of 12 m/s has been used.

Key:
SCSE = Plant ID number XXYYYZZZZ where XX=FIPS State, YYY=FIPS County, ZZZZ=NEDS plant Number
PNME = Plant Name
DSC3 = Construction Permit Number
EPDS = Point Description
DSC4 = Segment Description
SD07 = Initial permit approval date [Julian date: YYDDD]
LATITUDE = latitude in decimal degrees
LONGITUDE = longitude in decimal degrees
UTM13E = Zone 13 Universal Tranverse Mercator (UTM) easting (meters)
(UTM 1927,Clarke 1866,Central Meridian=-105,Ref Latitude=0,False Easting=500000,False Northing=0
UTM13N = Zone 13 UTM Northing (meters)
NOX_gps = Estimated Actual Emission Rate as Reported on APEN (grams per second, long-term)
StkH_m = Stack Height (meters)
StkT_K = Stack Gas Exit Temperature (Kelvin)
StkV_mps = Stack Gas Exit Velocity (meters per second)
StkD_m = Stack Diameter (meters)

TITLE:	**Change in Actual Emissions Between 1989 and 1999 (positive emissions = increment consumption; negative = increment expansion)**													
	(positive emissions = increment consumption; negative emissions = increment expansion)													
Source ID (SCSE):	**80670018**													
Plant Name (PNME):	**El Paso Natural Gas Bondad Compressor Station**													
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	KEY	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
SOLAR T3000 SN:8009663R91	12LP781-1	SOLAR T3000	80330	-107.769167	37.098056	0806700180011	253881.43868	4109129.84031	670018a	-0.940779	8.23	602.44	12.01	1.83
SOLAR T-3000 SN:1668C4R	12LP781-2	SOLAR T3000	80330	-107.769167	37.098056	0806700180021	253882.58519	4109148.19358	670018b	-0.940779	8.23	602.44	12.07	1.83
SOLAR CENTAUR T3002R	90LP125	SOLAR T4000	92169	-107.769167	37.098056	0806700180031	253875.32112	4109158.51727	670018c	0.000000	10.97	705.78	7.35	2.44
(3) CENTAUR 40-T5300L	97LP0803	(3) CENTAUR 40-T5300L	98112	-107.769167	37.098056	0806700180071	253874.93876	4109145.89941	670018d	6.723549	10.36	716.89	0.58	1.22
									total=	**4.84199**	**g/s =**	**168.30**	**ton/yr**	

Note: The stack velocity for the three T5300L turbines is listed as 0.58 m/s in AIRS. This appears to much too low and was causing apparent increment violations. Thus, in the ISCST hot-spot modeling the Division has assumed that the velocity is 12 m/s for each of these units. In addition, the stack location of each turbine was separated to more realistically show their most likely stack locations. This adjustment was made based on a review of a plot plan and DOQs. The revised coordinates for individual units are not shown here since they are only approximate.

11. Source-by-Source PSD Increment Analysis – Amoco Production Company Picnic Flats Facility (Scse 08670083)

11.1. Discussion

All existing sources at this facility appear to have been installed after the nitrogen dioxide minor source baseline date. This includes units S001, S006, S007, and S011. Units S002, S003, S004, and S005 were either not installed or have been removed from the site. Since they would have been increment consuming units, they are considered to be retired increment consuming units. As such, the emissions rates are set to zero for purposes of PSD increment modeling.

11.2. Excerpts from "TECHNICAL REVIEW DOCUMENT FOR OPERATING PERMIT 95OPLP169," Last Revised October 2, 1997

Source Description:
This source is classified as a natural gas production facility defined under Standard Industrial Classification 1311. This facility receives gas from production wells and utilizes three compressor engines to transmit natural gas further up the pipeline for additional processing. One additional internal combustion engine is used to power a water pump. This facility is located approximately 18 miles southwest of Durango in La Plata county (SE ¼ of NW ¼ of SE ¼ of Section 25, T33N R11W). This facility is located in an attainment area for all criteria pollutants. Mesa Verde National Park and Weminuche National Wilderness Area, Federal Class I designated areas, are within 100 km of this facility. New Mexico is within 50 miles of this facility. This facility is located on fee lands within the exterior boundaries of the Southern Ute Indian Reservation. This facility is minor with respect to Prevention of Significant Deterioration (PSD) requirements with facility wide emissions as follows:

Pollutant	Potential to Emit (tpy)	Actuals (tpy)
NOx	82.8	82.8
VOC	28.3	28.3
CO	109.4	109.4
HAPs	5.6	5.6

Since no actual emissions were reported on the revised APENs submitted with the Operating Permit application, actual emissions are assumed to be equal to

the potential to emit. Potential to emit is based on the emission limits provided in the construction permits issued for each engine. In its October 1, 1997 response to the Division's request for additional technical information, the source indicated that they were not subject to the requirements of 112(r).

Emission Sources:

A. (AIRS unit 001) Unit S001/C1: Caterpillar G399TA, 4-Cycle Turbocharged Internal Combustion Engine with Nonselective Catalytic Reduction, Rated at 660 hp (Maximum), Serial No. 49C352. Natural Gas Fired.

1. Applicable Requirements - A State of Colorado Modified Initial Approval Construction Permit (91LP651-1, dated July 15, 1996) was issued for this engine. This engine was moved to final approval status based upon the self-certification by the source that the unit was fully in compliance with each applicable requirement. The pertinent applicable requirements from this permit are as follows:

a. Visible emissions not to exceed 20 % opacity (condition 1)

b. Emission limits (condition 3):

Nitrogen Oxides:	31.8 tons/yr and 7.3 lbs/hr
Volatile Organic Compounds:	6.4 tons/yr and 1.5 lbs/hr
Carbon Monoxide:	19.1 tons/yr and 4.4 lbs/hr

c. Fuel consumption (condition 4):

Natural Gas	64.1 mmSCF/yr and 7,317 SCF/hr*

* The permit originally limited hourly fuel consumption to 6,022 SCF/hr, however, operating at 8760 hours per year the annual consumption limit would not be reached at this hourly rate. Therefore, the hourly fuel consumption limit was increased to allow for fuel consumption at the maximum hourly rate for the annual consumption limit. This modification was made directly in the Operating Permit since no additional applicable requirements were triggered by this modification. Emission limits remained the same.

2. Emission Factors - Emissions from reciprocating engines are produced during the combustion process, and are dependent upon the air to fuel ratio adjustment and specific properties of the natural gas being burned. The pollutants of concern are Nitrogen Oxides (NO), Carbon Monoxide (CO) and X Volatile Organic Compounds (VOC). Small quantities of HAPs are also emitted when combustion is incomplete. In the permit application the source indicated that they used the following emission factors to verify compliance with permit terms:

Pollutant	Emission Factor
NO	5 g/hp-hr X
VOC	1 g/hp-hr
CO	3 g/hp-hr

The NO emission factors are from the manufacturer and the VOC and CO X emission factors are limits that were defined in permit 91LP651-1, 3/21/94, initial approval (a file review indicated that these emission factors were supplied by the manufacturer). The emission factors for VOC and NO exceed the AP-42 X Emission Factors identified for 4-cycle rich burn engines with non-selective catalytic converters, Table 3.2-5 (October 1996) and the CO emission factor is less than the AP-42 emission factor.

For the draft Operating Permit these emission factors proposed by the source were converted to a fuel-based emission factor using the following equation:

$$\text{EF (lbs/mmBtu)} = \frac{[\text{EF (g/hp-hr)} \times (1\text{ lb}/453.6\text{ g}) \times \text{hp (maximum)}]}{\text{Design rate (mmBtu/hr)}}$$

B. (AIRS unit 003) Unit S002/C2: Superior 6G825, 4-Cycle Internal Combustion Engine, Rated at 460 HP (Maximum), Serial No. 277129. Natural Gas Fired.

This engine was originally identified in the Operating Permit application, however, the source replaced this engine with the Waukesha L5790GL (Colorado Construction Permit 97LP0184). This engine has been removed and Colorado Construction Permit 91LP651-2 has been canceled (per memo received April 8, 1997 from the source).

C. (AIRS unit 002) Unit S003/C3: Caterpillar G399TA, 2-Cycle Turbocharged Internal Combustion Engine with Nonselective Catalytic Reduction, Rated at 660 HP (Maximum), Serial No. 49C01127. Natural Gas Fired.

This engine was originally identified in the Operating Permit application, however, the source replaced this engine with the Waukesha L5790GL (Colorado Construction Permit 97LP0184). This engine has been removed and Colorado Construction Permit 91LP651-3 has been canceled (upon issuance of construction permit 97LP0184, condition 13).

D. (AIRS unit006) Units S004/W1 & S005/W2: Ford LSG-875, 2-Cycle Internal Combustion Engine, Rated at 90 HP (Maximum), Serial No. Unavailable. Natural Gas Fired.

These engines were originally identified in the Operating Permit application, however, based on correspondence received October 1, 1997 these engines have been removed. A request to cancel Colorado Construction permits 91LP651-4 and -5 was received on October 6, 1997.

E. (AIRS unit005) Unit S006/CH: Ford CSG-649, 2-Cycle Internal Combustion Engine, Rated at 60 HP (Maximum), Serial No. Unavailable. Natural Gas Fired.

1. Applicable Requirements - A State of Colorado Modified Initial Approval Construction Permit (91LP651-7, dated July 15, 1996) was issued for this engine. This engine was moved to final approval status based upon the self-certification by the source that the unit was fully in compliance with each applicable requirement. The pertinent applicable requirements from this permit are as follows:

a. Visible emissions not to exceed 20 % opacity (condition 1)

b. Emission limits (condition 3):

Nitrogen Oxides:	4.3 tons/yr and 1.0 lbs/hr
Volatile Organic Compounds:	0.6 tons/yr and 0.1 lbs/hr
Carbon Monoxide:	26.6 tons/yr and 6.1 lbs/hr

c. Fuel consumption (condition 4):

Natural Gas 9 mmSCF/yr and 1,027 SCF/hr*

* The permit originally limited hourly fuel consumption to 1,233 SCF/hr, however,

operating at 8760 hours per year the annual consumption limit would be exceeded at this rate. Therefore, the hourly fuel consumption limit was decreased to allow for fuel consumption at the maximum hourly rate for the annual consumption limit. This hourly limit is consistent with the maximum hourly consumption rate that was identified in the Operating Permit application. This modification was made directly in the Operating Permit since no additional applicable requirements were triggered by this modification. Emission limits remained the same.
2. Emission Factors - See previous discussion for unit S001/C1. For this unit the source proposed using the following emission factors to verify compliance with emission factors.

Pollutant	Emission Factor
NO	6.9 g/hp-hr X
VOC	0.9 g/hp-hr
CO	42.5 g/hp-hr

All emission factors are from the manufacturer. The proposed emission factors were compared to AP-42 (October 1996) emission factors. Although the source did not indicate that this was a lean burn engine, AP-42 only provides emission factors for 2-cycle lean burn engines. The emission factors for VOC and CO exceed the AP-42 Emission Factors Table 3.2-2 (October 1996) and the NOx emission factor is less than the AP-42 emission factor. As stated previously for unit S001/C1, these emission factors were converted to fuel based emission factors by the method discussed for unit S001/C1.

F. (AIRS unit 004) Unit S007/C4: Caterpillar G3516TA, 2-Cycle Lean Burn Internal Combustion Engine, Rated at 1085 HP (Maximum), Serial No. 2600297. Natural Gas Fired.

1. Applicable Requirements - A State of Colorado Modified Initial Approval Construction Permit (91LP651-7, dated July 15, 1996) was issued for this engine. This engine was moved to final approval status based upon the self-certification by the source that the unit was fully in compliance with each applicable requirement. The pertinent applicable requirements from this permit are as follows:
a. Visible emissions not to exceed 20 % opacity (condition 1)
b. Emission limits (condition 3):
Nitrogen Oxides: 25.1 tons/yr and 5.7 lbs/hr
Volatile Organic Compounds: 10.5 tons/yr and 2.4 lbs/hr
Carbon Monoxide: 31.4 tons/yr and 7.2 lbs/hr*
*The source requested a modification in the NO limits (previously 20.9 tons/yr x and 4.8 lbs/hr). This modification was made directly into the Operating Permit since the modification did not trigger any additional applicable requirements and no violation of National Ambient Air Quality Standards (NAAQS) is expected. c. Fuel consumption (condition 4):
Natural Gas 90.8 mmSCF/yr and 10,365 SCF/hr*
* The permit originally limited hourly fuel consumption to 9,422 SCF/hr, however, operating at 8760 hours per year the annual consumption limit would not be reached at this hourly rate. Therefore, the hourly fuel consumption limit was increased to allow for fuel consumption at the maximum hourly rate for the annual consumption limit. This

modification was made directly in the Operating Permit since no additional applicable requirements were triggered by this modification.
2. Emission Factors - See previous discussion for unit S001/C1. For this unit the source proposed using the following emission factors to verify compliance with permit terms.

Pollutant	Emission Factor
NO	2.4 g/hp-hr X
VOC	1 g/hp-hr
CO	3 g/hp-hr

The NO and CO emission factors are from an October 1995 stack test and the X VOC emission factor is from permit 91LP651-7, 3/21/94, initial approval (a file review indicated that these emission factors were supplied by the manufacturer). The emission factors for VOC and CO exceed the AP-42 Emission Factors identified for 2-cycle lean burn engines, Table 3.2-2 (October 1996) and the NOx emission factor is less than the AP-42 emission factor. As stated previously for unit S001/C1, these emission factors were converted to fuel based emission factors by the method discussed for unit S001/C1.

G. (AIRS unit 011) Unit S011/C5: Waukesha, L5790GL, Lean Burn Internal Combustion Engine, Rated at 1114 HP (Maximum), Serial No. Unavailable. Natural Gas Fired.

1. Applicable Requirements - A State of Colorado Initial Approval Construction Permit (97LP0184, dated June 4, 1997) was issued for this engine. This engine was moved to final approval status based upon the self-certification by the source that the unit was fully in compliance with each applicable requirement. The pertinent applicable requirements from this permit are as follows:
a. Visible emissions not to exceed 20 % opacity (condition 1)
b. Emission limits (condition 3):
Nitrogen Oxides: 21.6 tons/yr and 5.0 lbs/hr
Volatile Organic Compounds: 10.8 tons/yr and 2.5 lbs/hr
Carbon Monoxide: 32.3 tons/yr and 7.4 lbs/hr
c. Fuel consumption (condition 4):
Natural Gas 8,856 SCF/hr and 66.5
mmSCF/yr
d. Performance test (condition 6):
A performance test will be conducted to determine the emission rates of
Oxides of Nitrogen and Carbon Monoxide using EPA approved methods.
2. Emission Factors - See previous discussion for unit S001/C1. For this unit the source proposed using the following emission factors to verify compliance with permit terms.

Pollutant	Emission Factor
NO	2.0 g/hp-hr X
VOC	1.0 g/hp-hr
CO	3.0 g/hp-hr

The source of the emission factors was not identified in the permit application. Because the source did not identify whether this engine was a 2-cycle or a 4- cycle engine, the Division compared the proposed emission factors to AP-42 (October 1996) emission factors for both 2-cycle and 4-cycle lean burn engines.

The emission factors for CO and VOC exceed the AP-42 Emission Factors identified in Table 3.2-2 (October 1996) and the NO emission factor is less than X the AP-42 emission factor. As stated previously for unit S001/C1, these emission factors are converted to fuel based emission factors by the method discussed for unit S001/C1.

11.3. Location Verfication with USGS Digital Orthophoto Quadrangles (DOQs) and Modeling Results

Facility locations and coordinates have been verified with USGS digital orthophoto quadrangles (DOQs). A DOQ is a computer-generated image of an aerial photograph in which displacements caused by terrain relief and camera tilts have been removed. It combines the image characteristics of a photograph with the geometric qualities of a map. In this case, unit specific coordinates have been digitized in ArcView by comparing the source locations on a plot plan with the orthophoto (see figure on the next page).

On the DOQ, according to AIRS, units 1, 4, 5, and 11 are operational units. Units 2, 3, 6, 7, 8, 9, and 10 are not or were never operational. Please note that the operating permit unit numbers don't all match with the AIRS unit numbers, but a comparison of the data in AIRS against the operating permit suggests that the AIRS data are acceptable for modeling as is.

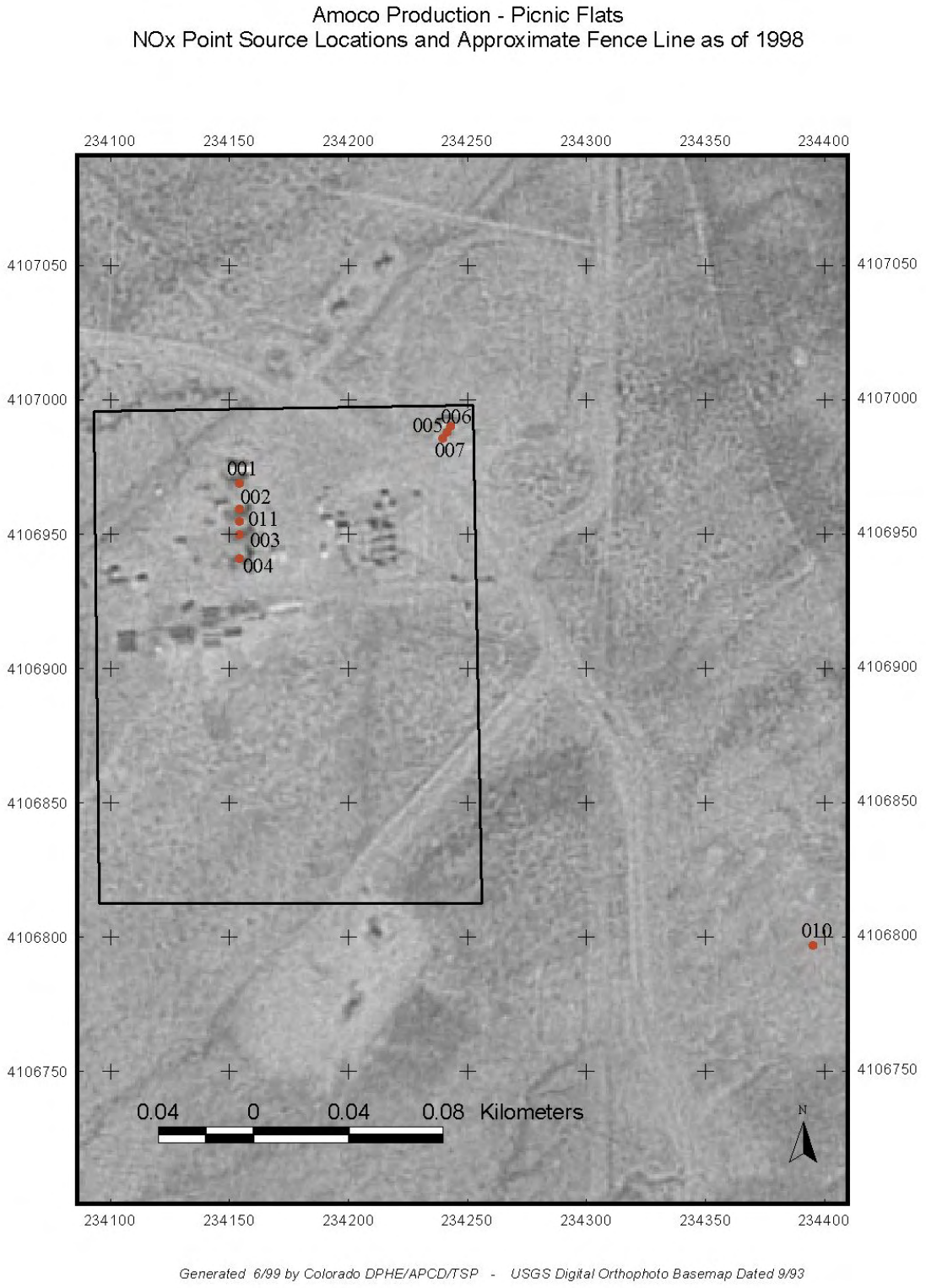


Figure 28. Location of Amoco Picnic Flats facility on a USGS DOQ.

11.4. Emission Inventory

Table 17. Amoco Picnic Flats (SCSE 080670083) emission inventories.

TITLE:	**1999 Emission Inventory**												
Source ID (SCSE):	**80670083**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
CAT G399TA COMP #1 660HP	91LP651-1	CAT G399TA COMP#1 660HP	94080	-107.990278	37.073056	234154.47	4106977.95	670083a	0.912187	4.27	644.11	69.16	0.15
CAT G399TA COMP #2 660HP	91LP651-3.CANC	CAT G399TA CMPRSR#2 660HP	92208	-107.990278	37.073056	234154.47	4106967.12	670083b	0.000000	4.27	644.11	69.16	0.15
SUPERIOR 6G825 #3 460HP	91LP651-2.CANC	SUPERIOR 6G825 ENG3 460HP	92208	-107.990278	37.073056	234154.47	4106956.57	670083c	0.000000	4.57	810.78	60.72	0.15
CAT G3516TA 1085HP COMP#4	91LP651-7	CAT G3516TA COMP#4 1085HP	96196	-107.990278	37.073056	234154.47	4106946.27	670083d	0.604299	7.32	689.11	36.82	0.30
FORD CSG649 V6 ENG 60HP	91LP651.6-XP	FORD CSG649 V6 60HP ENG.	92208	-107.990278	37.073056	234241.58	4106999.59	670083e	0.123373	2.74	644.11	58.89	0.05
FORD LSG875 TRIPLEX1 90HP	91LP651-4.XP.CANC	FORD LSG875 V8 ENG. 90HP	92208	-107.990278	37.073056	234243.17	4107002.23	670083f	0.000000	3.05	644.11	53.43	0.06
FORD LSG875 V8 ENG 90HP	91LP651-5.XP.CANC	FORD LSG675 TRIPLEX2 90HP	92208	-107.990278	37.073056	234239.74	4106996.69	670083g	0.000000	3.05	644.11	53.43	0.06
FORD CSG649 V6 ENG 60HP	91LP557.CANC	FORD CSG649 V6 ENG 60HP	92082	-107.990278	37.073056	233563.04	4107660.02	670083h	0.000000	2.74	644.11	58.89	0.05
FORD CSG649 V6 ENG 60HP	91LP560.CANC	FORD CSG649 V6 ENG 60HP	92082	-107.990278	37.073056	234193.17	4105260.40	670083i	0.000000	2.74	644.11	58.89	0.06
AJAX E-42 ENGINE 36HP	91LP556.CANC	AJAX E-42 ENGINE 36HP	92082	-107.990278	37.073056	234395.37	4106783.74	670083j	0.000000	3.35	569.11	9.78	0.15
WAUKESHA L5790GL	97LP0184	WAUKESHA L5790GL ENGINE	97154	-107.990278	37.073056	234154.47	4106961.85	670083k	0.618555	5.49	533.00	35.30	0.30
								total=	**2.25841**	**g/s =**	**78.50**	**ton/yr**	

Key:
SCSE = Plant ID number XXYYYZZZZ where XX=FIPS State, YYY=FIPS County, ZZZZ=NEDS plant Number
PNME = Plant Name
DSC3 = Construction Permit Number
EPDS = Point Description
DSC4 = Segment Description
SD07 = Initial permit approval date [Julian date: YYDDD]
LATITUDE = latitude in decimal degrees
LONGITUDE = longitude in decimal degrees
UTM13E = Zone 13 Universal Tranverse Mercator (UTM) easting (meters)
(UTM 1927,Clarke 1866,Central Meridian=-105,Ref Latitude=0,False Easting=500000,False Northing=0
UTM13N = Zone 13 UTM Northing (meters)
NOX_gps = Estimated Actual Emission Rate as Reported on APEN (grams per second, long-term)
StkH_m = Stack Height (meters)
StkT_K = Stack Gas Exit Temperature (Kelvin)
StkV_mps = Stack Gas Exit Velocity (meters per second)
StkD_m = Stack Diameter (meters)

TITLE:	**1989 Emission Inventory**												
Source ID (SCSE):	**80670083**												
Plant Name (PNME):	**AMOCO PRODUCTION CO. PICNIC FLATS**												
	This source did not exist in 1989.												

TITLE:	**Change in Actual Emissions Between 1989 and 1999 (positive emissions = increment consumption; negative = increment expansion)**												
Source ID (SCSE):	**80670083**												
Plant Name (PNME):	**AMOCO PRODUCTION CO. PICNIC FLATS**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
CAT G399TA COMP #1 660HP	91LP651-1	CAT G399TA COMP#1 660HP	94080	-107.990278	37.073056	234154.47	4106977.95	670083a	0.912187	4.27	644.11	69.16	0.15
CAT G399TA COMP #2 660HP	91LP651-3.CANC	CAT G399TA CMPRSR#2 660HP	92208	-107.990278	37.073056	234154.47	4106967.12	670083b	0.000000	4.27	644.11	69.16	0.15
SUPERIOR 6G825 #3 460HP	91LP651-2.CANC	SUPERIOR 6G825 ENG3 460HP	92208	-107.990278	37.073056	234154.47	4106956.57	670083c	0.000000	4.57	810.78	60.72	0.15
CAT G3516TA 1085HP COMP#4	91LP651-7	CAT G3516TA COMP#4 1085HP	96196	-107.990278	37.073056	234154.47	4106946.27	670083d	0.604299	7.32	689.11	36.82	0.30
FORD CSG649 V6 ENG 60HP	91LP651.6-XP	FORD CSG649 V6 60HP ENG.	92208	-107.990278	37.073056	234241.58	4106999.59	670083e	0.123373	2.74	644.11	58.89	0.05
FORD LSG875 TRIPLEX1 90HP	91LP651-4.XP.CANC	FORD LSG875 V8 ENG. 90HP	92208	-107.990278	37.073056	234243.17	4107002.23	670083f	0.000000	3.05	644.11	53.43	0.06
FORD LSG875 V8 ENG 90HP	91LP651-5.XP.CANC	FORD LSG675 TRIPLEX2 90HP	92208	-107.990278	37.073056	234239.74	4106996.69	670083g	0.000000	3.05	644.11	53.43	0.06
FORD CSG649 V6 ENG 60HP	91LP557.CANC	FORD CSG649 V6 ENG 60HP	92082	-107.990278	37.073056	233563.04	4107660.02	670083h	0.000000	2.74	644.11	58.89	0.05
FORD CSG649 V6 ENG 60HP	91LP560.CANC	FORD CSG649 V6 ENG 60HP	92082	-107.990278	37.073056	234193.17	4105260.40	670083i	0.000000	2.74	644.11	58.89	0.06
AJAX E-42 ENGINE 36HP	91LP556.CANC	AJAX E-42 ENGINE 36HP	92082	-107.990278	37.073056	234395.37	4106783.74	670083j	0.000000	3.35	569.11	9.78	0.15
WAUKESHA L5790GL	97LP0184	WAUKESHA L5790GL ENGINE	97154	-107.990278	37.073056	234154.47	4106961.85	670083k	0.618555	5.49	533.00	35.30	0.30
								total=	**2.25841**	**g/s =**	**78.50**	**ton/yr**	

12. Source-by-Source PSD Increment Analysis – Amoco Production Company Tiffany Compressor Station (Scse 08670035)

12.1. Discussion

Based on initial permit dates, the two units at this facility have been identified as baseline sources with respect to the minor source baseline date of March 30, 1989 in Colorado. As such, only changed in actual emissions from the baseline date to the present can affect increments. In this study, it has been assumed that the actual emissions reported in the most recent APEN reflect actual emissions for both the minor source baseline date and the present.

12.2. Excerpts from "TECHNICAL REVIEW DOCUMENT FOR OPERATING PERMIT 95OPLP0063," July 30, 1997

Source Description:
The applicant indicated that this facility is defined under Standard Industrial Classification 1321, which describes establishments primarily engaged in producing liquid hydrocarbons from oil and gas field gases. After further investigation, it appears that this source should be classified as a natural gas compression facility defined under Standard Industrial Classification 4922. At this facility, gas is compressed to specification for transmission to sales pipelines using two Internal Combustion Engines to power two compressor units. A triethylene glycol dehydration unit also exists on site. The facility is located in a rural area north of Tiffany in La Plata County, Colorado, in an area designated as attainment for all criteria pollutants. New Mexico is designated as an affected state located within a 50-mile radius of the facility. Mesa Verde National Park and the Weminuche National Wilderness Area are Federal Class I areas located within 100 kilometers of the facility. This facility is located on fee lands within the exterior boundaries of the Southern Ute Indian Reservation. This facility is minor with respect to Prevention of Significant Deterioration (PSD) requirements and has facility-wide potential and actual emissions as follows:

Pollutant	Potential to Emit (tpy)	Actual Emissions (tpy)
NOx	136.6	123.0
VOC	14.5	6.3
CO	24.5	20.7
HAPs	2.0	<2.0

Potential emissions are taken from the revised construction permits for this facility. Actual emissions are taken from AIRS summary data dated March 24, 1994. Actual HAP emission data were not available. The Division assumes that emissions from the facility have remained the same or decreased from the levels listed above. The applicant certified, in an additional information submittal, that the facility was in compliance with all applicable requirements at the time of application submittal. The applicant indicated that the facility is subject to 112(r).

Emission Sources:
The following sources are specifically regulated under terms and conditions of the Operating Permit for this Site:

Unit P001- AJAX Model DPC-800, Natural Gas Fired 2 Cycle Standard Lean Burn Internal Combustion Engine Site Rated at 690 HP, Serial No. 82576

Discussion:
1. Applicable Requirements- Prior to application submittal, Colorado Emission Permit 88LP048-6 defined applicable requirements for this engine. As part of the application process, Amoco proposed new emission limits based on manufacturer's emission factor data and a flue gas screening analysis. Therefore, the aforementioned permit was revised to reflect emission limits consistent with the requested changes. The following terms and conditions of the revised Construction Permit have been incorporated into the draft Operating Permit as applicable requirements: annual and hourly emission limits for NOx, CO and VOC, annual and hourly fuel use limitations and a 20% opacity limit.
2. Emission Factors- Emissions from this reciprocating engine is produced during the combustion process, and are dependent upon the air to fuel ratio adjustment, engine design and specific properties of the natural gas being burned. The pollutants of concern are nitrogen oxides (NOx), carbon monoxide (CO) and volatile organic compounds (VOCs). Small quantities of Hazardous Air Pollutants (HAPs) are also emitted when combustion is incomplete. The applicant asserts that all HAP emissions except formaldehyde are below APEN reporting de minimis levels. The applicant proposes to calculate NOx and VOC emissions using emission factors supplied by the manufacturer and to calculate CO emissions using an emission factor developed from a flue gas screening analysis. The formaldehyde emission factor is taken from GRI engine testing data. These emission factors are as follows:

Pollutant	Emission Factor Source
NOx	16.0 g/hphr Mfr data
CO	.9 g/hphr Flue gas data
VOC	1.5 g/hphr Mfr data
Formaldehyde	0.2 g/hphr GRI data

The NOx, CO and VOC emission factors proposed by the applicant are higher than the AP-42 (US EPA) factors listed in Table 3.2-2, January 1995. The formaldehyde emission

factor being proposed by the applicant is lower than the AP-42 factor listed in Table 3.2-3, but the factors in that table are based on very limited data and, consequently, have a poor factor rating. The Division has elected to accept all of the emission factors proposed by the applicant for this engine.

It is Division policy, for permitted engines, to convert the horsepower based emission factors to fuel based emission factors. This will result in the source being out of compliance if an excessive amount of fuel is combusted in this engine. The emission factor conversion is accomplished using the horsepower based emission factors, the design heat rate of the engine and the engine horsepower, as shown on the attached calculation sheet. The resulting fuel based emission factors are as follows:

Pollutant	Emission Factor Source
NOx	4.27 lb/MMBtu Conversion
CO	0.77 lb/MMBtu Conversion
VOC	0.40 lb/MMBtu Conversion
Formaldehyde	0.053 lb/MMBtu Conversion

Unit P002- AJAX Model DPC-360, Natural Gas Fired 2 Cycle Standard Rich Burn Internal Combustion Engine Site Rated at 310 HP, Serial No. 80754

Discussion:

1. Applicable Requirements- Prior to application submittal, Colorado Emission Permit 89LP132 defined applicable requirements for this engine. As part of the application process, Amoco proposed new emission limits based on manufacturer's emission factor data and a flue gas screening analysis. Therefore, the aforementioned permit was revised to reflect emission limits consistent with the requested changes. The following terms and conditions of the revised Construction Permit have been incorporated into the draft Operating Permit as applicable requirements: annual and hourly emission limits for NOx, CO and VOC, annual and hourly fuel use limitations and a 20% opacity limit.

2. Emission Factors- Emissions from these reciprocating engines are produced during the combustion process, and are dependent upon the air to fuel ratio adjustment and specific properties of the natural gas being burned. The pollutants of concern are nitrogen oxides (NOx), carbon monoxide (CO) and volatile organic compounds (VOCs). Small quantities of Hazardous Air Pollutants (HAPs) are also emitted when combustion is incomplete. The applicant asserts that all HAP emissions except formaldehyde are below APEN reporting de minimis levels. The applicant proposes to calculate VOC emissions using an emission factor based on engineering judgement and to calculate NOx and CO emissions using emission factors developed from a flue gas screening analysis. The formaldehyde emission factor is taken from GRI engine testing data. These emission factors are as follows:

Pollutant	Emission Factor Source
NOx	10.0 g/hphr Flue gas data
CO	1.7 g/hphr Flue gas data

VOC	1.5 g/hphr Eng judgement
Formaldehyde	0.2 g/hphr GRI data

The CO and VOC emission factors proposed by the applicant are higher than the AP-42 (US EPA) factors listed in Table 3.2-2, January 1995. The NOx emission factor proposed by the applicant is slightly lower than the AP-42 factor listed in Table 3.2-1. The formaldehyde emission factor being proposed by the applicant is lower than the AP-42 factor listed in Table 3.2-3, but the factors in that table are based on very limited data and, consequently, have a poor factor rating. The Division has elected to accept all of the emission factors proposed by the applicant for this engine. It is Division policy, for permitted engines, to convert the horsepower based emission factors to fuel based emission factors. This will result in the source being out of compliance if an excessive amount of fuel is combusted in this engine. The emission factor conversion is accomplished using the horsepower based emission factors, the design heat rate of the engine and the engine horsepower, as shown on the attached calculation sheet. The resulting fuel based emission factors are as follows:

Pollutant	Emission Factor Source
NOx	2.44 lb/MMBtu Conversion
CO	0.41 lb/MMBtu Conversion
VOC	0.37 lb/MMBtu Conversion
Formaldehyde	0.049 lb/MMBtu Conversion

12.3. Location Verfication with USGS Digital Orthophoto Quadrangles (DOQs) and Modeling Results

Facility locations and coordinates have been verified with USGS digital orthophoto quadrangles (DOQs). A DOQ is a computer-generated image of an aerial photograph in which displacements caused by terrain relief and camera tilts have been removed. It combines the image characteristics of a photograph with the geometric qualities of a map. In this case, unit specific coordinates have been digitized in ArcView by comparing the source locations on a plot plan with the orthophoto (see figure on the next page).

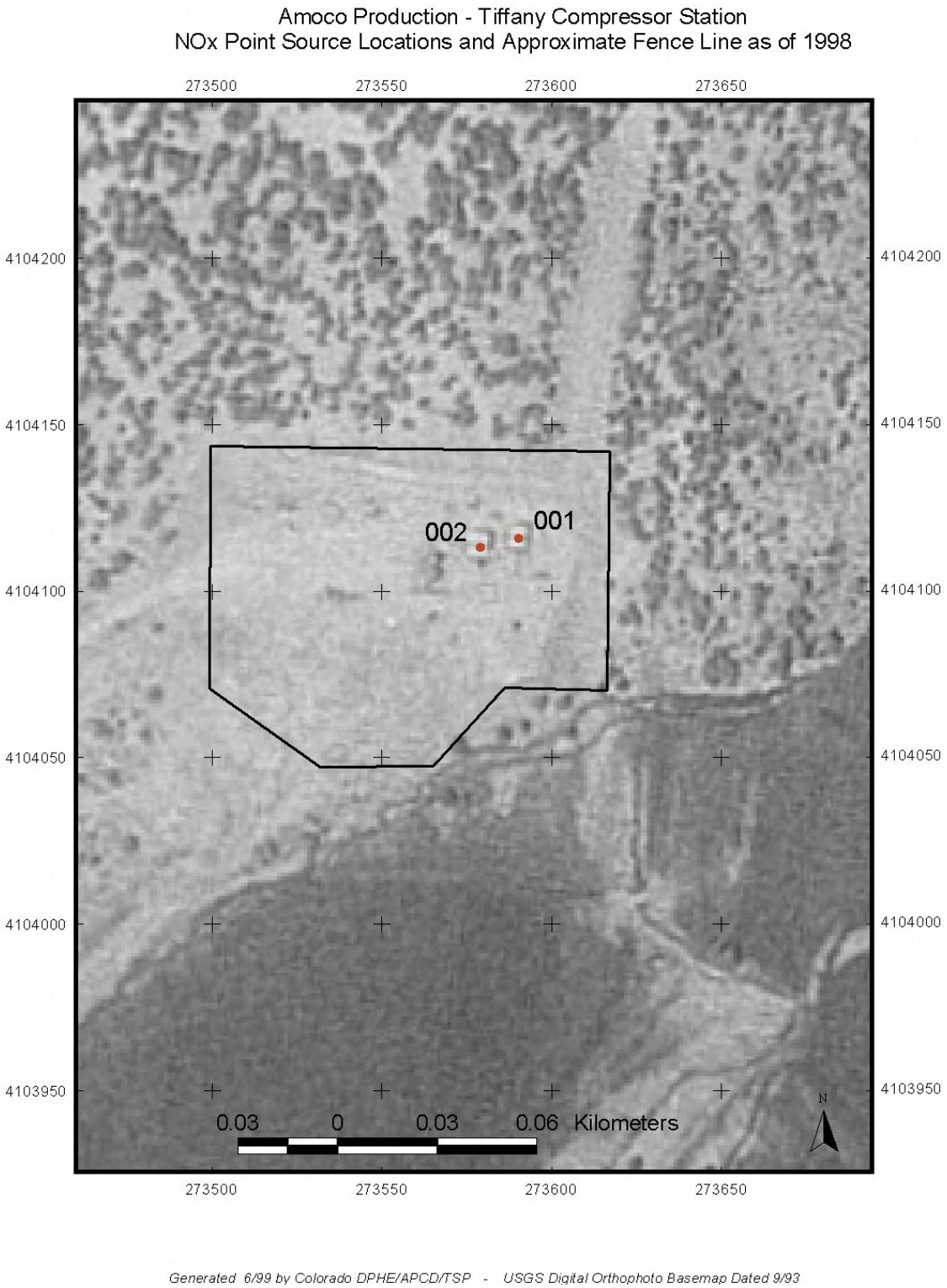


Figure 29. Location of Amoco Tiffany on a USGS DOQ.

12.4. Emission Inventory

Table 18. Amoco Tiffany (SCSE 080670035) emission inventories.

TITLE:	**1999 Emission Inventory**												
Source ID (SCSE):	**80670035**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
AJAX DPC-360 SERIAL#80754	89LP132	AJAX DPC-360 S/N 80754	95361	-107.546667	37.057778	273590.6894	4104115.664	670035a	0.837117	6.71	644.11	16.49	0.30
AJAX DPC-800 SERIAL#82576	88LP048-6	AJAX DPC-800 S/N 82576	95361	-107.546667	37.057778	273579.1573	4104112.961	670035b	3.084788	2.44	644.11	21.92	0.37
								total=	**3.92191**	**g/s =**	**136.32**	**ton/yr**	

Key:
SCSE = Plant ID number XXYYYZZZZ where XX=FIPS State, YYY=FIPS County, ZZZZ=NEDS plant Number
PNME = Plant Name
DSC3 = Construction Permit Number
EPDS = Point Description
DSC4 = Segment Description
SD07 = Initial permit approval date [Julian date: YYDDD]
LATITUDE = latitude in decimal degrees
LONGITUDE = longitude in decimal degrees
UTM13E = Zone 13 Universal Tranverse Mercator (UTM) easting (meters)
(UTM 1927,Clarke 1866,Central Meridian=-105,Ref Latitude=0,False Easting=500000,False Northing=0
UTM13N = Zone 13 UTM Northing (meters)
NOX_gps = Estimated Actual Emission Rate as Reported on APEN (grams per second, long-term)
StkH_m = Stack Height (meters)
StkT_K = Stack Gas Exit Temperature (Kelvin)
StkV_mps = Stack Gas Exit Velocity (meters per second)
StkD_m = Stack Diameter (meters)

TITLE:	**1989 Emission Inventory**												
Source ID (SCSE):	**80670035**												
Plant Name (PNME):	**AMOCO PRODUCTION CO TIFFANY COMPRESSOR**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
AJAX DPC-360 SERIAL#80754	89LP132	AJAX DPC-360 S/N 80754	95361	-107.546667	37.057778	273590.6894	4104115.664	670035a	0.837117	6.71	644.11	16.49	0.30
AJAX DPC-800 SERIAL#82576	88LP048-6	AJAX DPC-800 S/N 82576	95361	-107.546667	37.057778	273579.1573	4104112.961	670035b	3.084788	2.44	644.11	21.92	0.37
								total=	**3.92191**	**g/s =**	**136.32**	**ton/yr**	

TITLE:	**Change in Actual Emissions Between 1989 and 1999 (positive emissions = increment consumption; negative = increment expansion)**												
Source ID (SCSE):	**80670035**												
Plant Name (PNME):		**AMOCO PRODUCTION CO TIFFANY COMPRESSOR**											
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
AJAX DPC-360 SERIAL#80754	89LP132	AJAX DPC-360 S/N 80754	95361	-107.546667	37.057778	273590.6894	4104115.664	670035a	0.000000	6.71	644.11	16.49	0.30
AJAX DPC-800 SERIAL#82576	88LP048-6	AJAX DPC-800 S/N 82576	95361	-107.546667	37.057778	273579.1573	4104112.961	670035b	0.000000	2.44	644.11	21.92	0.37
								total=	**0.00000**	**g/s =**	**0.00**	**ton/yr**	

13. Source-by-Source PSD Increment Analysis – Williams Field Services Buena Suerta (Scse 08670179)

13.1. Discussion

Based on a July 1999 information from Williams Field Services, the Buena Suerta facility is not yet operational. Even though the intent of this study is to quantify existing increment consumption, Buena Suerta has been included in the overall modeling analysis. In the cumulative impact modeling, it has been represented by a single geographic coordinate. Any results at receptors near Buena Suerta should be reviewed with caution with respect to quantifying "existing" increment consumption since the facility does not yet exist.

Once the facility is built and operational, all emissions from it will be increment consuming. Permits for four Waukesha engines (AIRS IDs 001 – 004) issued in 1994 have expired. A new permit was issued in 1998 for five units.

The Division does not currently have a final plot plan nor individual unit coordinates for this facility. Thus, refined modeling near the source has not been performed.

13.2. Location Verfication with USGS Digital Orthophoto Quadrangles (DOQs) and Modeling Results

The geographic coordinate for the facility provided with the permit application has been plotted on a USGS digital orthophoto quadrangles (DOQs) and is shown on the next page. A DOQ is a computer-generated image of an aerial photograph in which displacements caused by terrain relief and camera tilts have been removed. It combines the image characteristics of a photograph with the geometric qualities of a map. As can be seen , the AIRS database currently has only a facility-wide coordinate for this facility.

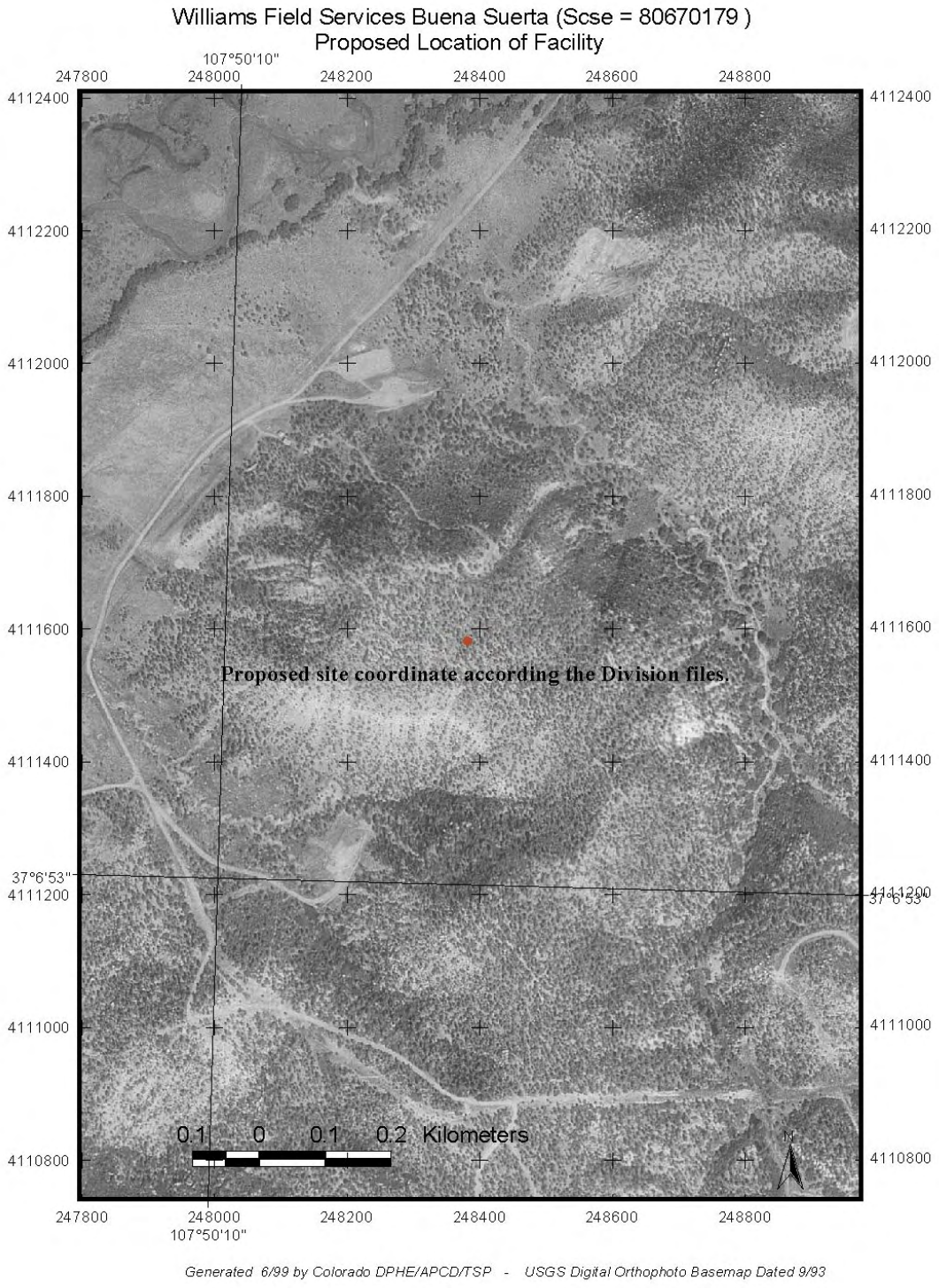


Figure 30. Approximate (permitted) location of the WFS Buena Suerta facility on a USGS DOQ. It had not yet been constructed at the time this study was performed.

13.3. Emission Inventory

Table 19. WFS Buena Suerta (SCSE 080670179) emission inventories.

TITLE:	**1999 Emission Inventory (as of July 1999, this source is not operational)**												
Source ID (SCSE):	**80670179**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
WAUKESHA ENGINE #1	94LP185-1.EXPIRED	WAUKESHA #1-NATURAL GAS	94242	-107.831944	37.118611	248382.4606	4111581.22	670179a	0.000000	8.23	673.00	24.38	0.60
WAUKESHA ENGINE #2	94LP185-2.EXPIRED	WAUKESHA #2 - NAT GAS COM	94242	-107.831944	37.118611	248382.4606	4111581.22	670179b	0.000000	8.23	673.00	24.38	0.60
WAUKESHA ENGINE #3	94LP185-3.EXPIRED	WAUKESHA #3 -NAT.GAS COMB	94242	-107.831944	37.118611	248382.4606	4111581.22	670179c	0.000000	8.23	673.00	24.38	0.60
WAUKESHA ENGINE #4	94LP185-4.EXPIRED	WAUKESHA #4-NAT.GAS COMB	94242	-107.831944	37.118611	248382.4606	4111581.22	670179d	0.000000	8.23	673.00	24.38	0.60
WAUKESHA 12V AT27GL	98LP0468	WAUKESHA 12V AT27GL	98289	-107.831944	37.118611	248382.4606	4111581.22	670179e	1.153677	8.23	628.00	30.88	0.61
WAUKESHA 12V AT27GL	98LP0468	WAUKESHA 12V AT27GL ENGIN	98289	-107.831944	37.118611	248382.4606	4111581.22	670179f	1.153677	8.23	628.00	30.88	0.61
WAUKESHA 12V AT27GL 2768H	98LP0470	WAUKESHA 12V AT27L 2768HP	98289	-107.831944	37.118611	248382.4606	4111581.22	670179g	1.153677	8.23	628.00	30.88	0.61
WAUKESHA 12V AT27GL	98LP0471	WAUKESHA 12V AT27GL	98289	-107.831944	37.118611	248382.4606	4111581.22	670179h	1.153677	8.23	516.89	30.88	0.61
WAUKESHA 12V AT27GL ENGIN	98LP0472	WAUKESHA 12V AT27GL	98289	-107.831944	37.118611	248382.4606	4111581.22	670179i	1.153677	8.23	516.89	30.88	0.61
								total=	**5.76839**	**g/s =**	**200.50**	**ton/yr**	

Key:
SCSE = Plant ID number XXYYYZZZZ where XX=FIPS State, YYY=FIPS County, ZZZZ=NEDS plant Number
PNME = Plant Name
DSC3 = Construction Permit Number
EPDS = Point Description
DSC4 = Segment Description
SD07 = Initial permit approval date [Julian date: YYDDD]
LATITUDE = latitude in decimal degrees
LONGITUDE = longitude in decimal degrees
UTM13E = Zone 13 Universal Tranverse Mercator (UTM) easting (meters)
(UTM 1927,Clarke 1866,Central Meridian=-105,Ref Latitude=0,False Easting=500000,False Northing=0
UTM13N = Zone 13 UTM Northing (meters)
NOX_gps = Estimated Actual Emission Rate as Reported on APEN (grams per second, long-term)
StkH_m = Stack Height (meters)
StkT_K = Stack Gas Exit Temperature (Kelvin)
StkV_mps = Stack Gas Exit Velocity (meters per second)
StkD_m = Stack Diameter (meters)

14. Source-by-Source PSD Increment Analysis – Public Service Company Tiffany (Scse 08670158)

14.1. Discussion

All units at this facility were installed prior to the major or minor source baseline dates for nitrogen dioxide. Thus, only changes in actuals emissions between the minor source baseline date (March 30, 1989) and the present affect PSD increment for NO_2. In this case, it has been assumed that the actual emissions reported on the most recent APEN reflect both current and baseline actual emissions. As such, it has been assumed in this study that this facility does not consume or expand PSD increment.

14.2. Excerpts from "TECHNICAL REVIEW DOCUMENT FOR OPERATING PERMIT 95OPLP0078," Last Revised June 18, 1997

Source Description:

This source is classified as a natural gas compression facility defined under Standard Industrial Classification 4922. This facility uses three gas-fired compressor engines for natural gas transmission and two glycol dehydrators to remove water from the gas. This facility is located approximately 9 miles southeast of Ignacio in La Plata county (Section 4, T32N, R6W). This facility is located in an attainment area for all criteria pollutants. New Mexico is within 50 miles of this facility. Mesa Verde National Park and Weminuche National Wilderness Area, Federal Class I designated areas, are within 100 km of this facility. This facility is located on fee lands within the exterior boundaries of the Southern Ute Indian Reservation. This facility is minor with respect to Prevention of Significant Deterioration (PSD) requirements with facility wide emissions as follows:

Pollutant	Potential to Emit (tpy)	Actuals (tpy)
NOx	162	96
VOC	57.5	27.4
CO	198	120
HAPs	12.2	11

Potential to emit is based on information supplied in the Operating Permit application for regulated units and in the response to construction permit final approval issues submitted March 20, 1997. Actual emissions are based on the latest Air Pollution Emission Notices (APENs) for each piece of equipment, which were submitted with the Operating Permit application. This facility has indicated that they are not subject to the 112(r) Accidental Release Requirements.

Emission Sources:

A. Units E001, E002, & E003: White-Superior, Model 8G825, 4-Cycle Internal Combustion Engines, Site Rated at 660 HP, Serial Nos. 21086, 268139, & 274239. Natural Gas Fired.
1. Applicable Requirements - These units were first placed into service and last modified in 1974 (E001), 1977 (E002), and 1980 (E003). These engines are permit exempt under the provision that construction commenced or operation began prior to October 1, 1983 and the engines are rated at less than 1,000 horsepower. Therefore the only specific applicable requirements that apply to these units are a 20% Opacity limit (Regulation 1, Section II.A.1) and APEN reporting (Regulation 3, Part A Section II). 2. Emission Factors - Emissions from reciprocating engines are produced during the combustion process, and are dependent upon the air to fuel ratio adjustment and specific properties of the natural gas being burned. The pollutants of concern are Nitrogen Oxides (NOx), Carbon Monoxide (CO) and Volatile Organic Compounds (VOC). Small quantities of HAPs are also emitted when combustion is incomplete. Approval of emission factors for these units is necessary to the extent that accurate actual emissions are required to verify the need to submit Revised APENs to update the Division's Emission Inventory. The source is proposing to use emission factors provided by the manufacturer. The emission factors are:

Pollutant	Emission Factor
NO	2.40 lbs/mmBtu x
CO	2.96 lbs/mmBtu
VOC	0.13 lbs/mmBtu

These emission factors are higher than those identified in AP-42 (January 1995), Section 3.2, Table 3.2-2 for 4-cycle rich burn engines.

14.3. Location Verfication with USGS Digital Orthophoto Quadrangles (DOQs) and Modeling Results

Facility locations and coordinates have been verified with USGS digital orthophoto quadrangles (DOQs). A DOQ is a computer-generated image of an aerial photograph in which displacements caused by terrain relief and camera tilts have been removed. It combines the image characteristics of a photograph with the geometric qualities of a map. In this case, unit specific coordinates have been digitized in ArcView by comparing the source locations on a plot plan with the orthophoto (see figure on the next page).

No fence line is actually shown on the plot plan, only the extent of the cleared area. The "fence line" in shown on the next page is an approximation of this area.

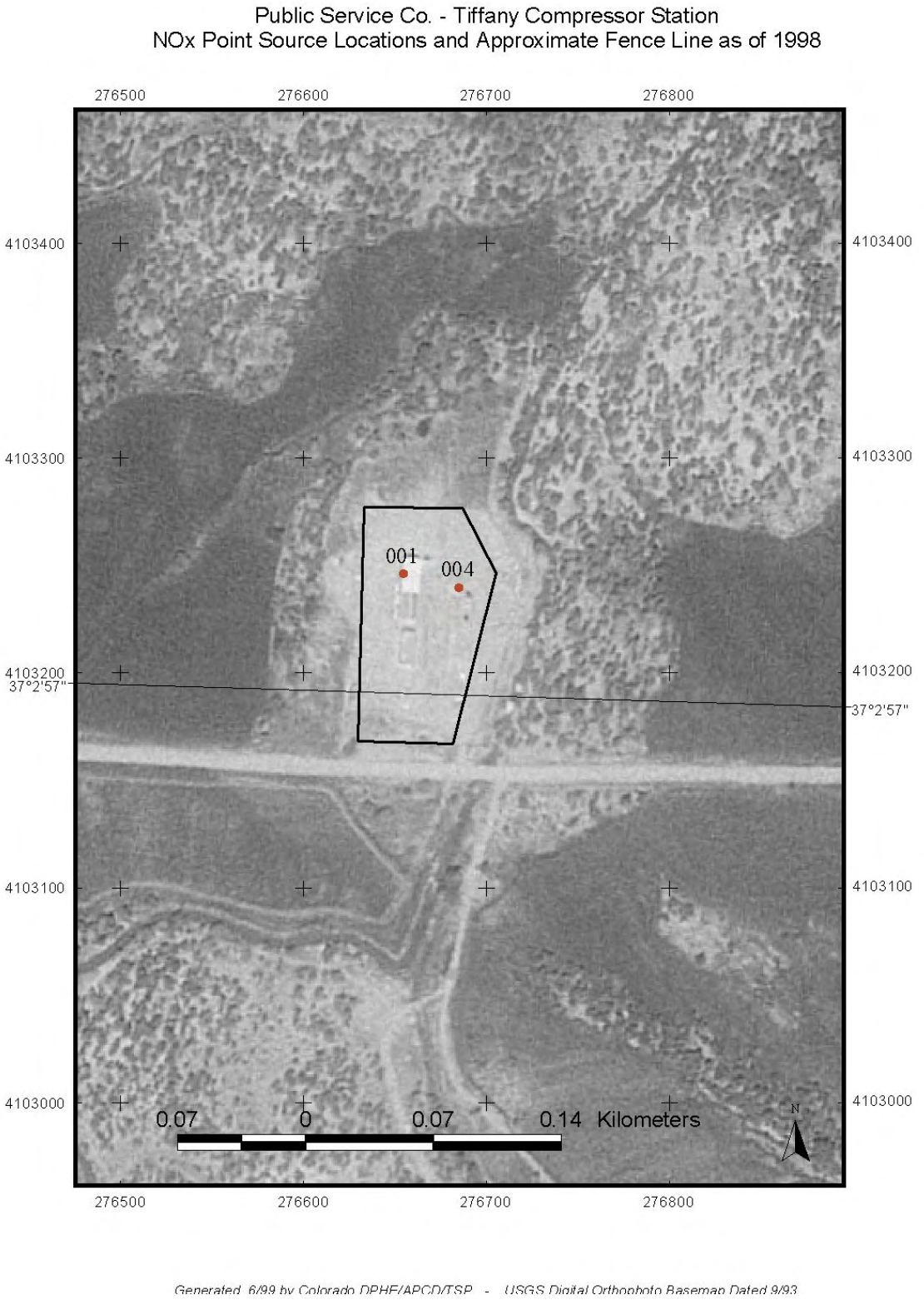


Figure 31. Location of Public Service Co. Tiffany facility on a USGS DOQ.

14.4. Emission Inventory

Table 20. Public Service Co. Tiffany (SCSE 0806701598) emission inventories.

TITLE:	**1999 Emission Inventory**												
Source ID (SCSE):	**80670158**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
(3) SUPERIOR 8G825'S	95OPLP078	(3) SUPERIOR 8G825'S		-107.511389	37.050833	276654.6685	4103251.813	670158a	2.646840	5.49	999.67	11.13	0.24
ELASTEC SMARTASH RECOVERY	97LP0890	ELASTEC SMARTASH RECOVERY		-107.511389	37.050833	276685.0423	4103244.344	670158b	0.000288	5.49	533.00	6.10	0.24
								total=	**2.64713**	**g/s =**	**92.01**	**ton/yr**	

Key:
SCSE = Plant ID number XXYYYZZZZ where XX=FIPS State, YYY=FIPS County, ZZZZ=NEDS plant Number
PNME = Plant Name
DSC3 = Construction Permit Number
EPDS = Point Description
DSC4 = Segment Description
SD07 = Initial permit approval date [Julian date: YYDDD]
LATITUDE = latitude in decimal degrees
LONGITUDE = longitude in decimal degrees
UTM13E = Zone 13 Universal Tranverse Mercator (UTM) easting (meters)
(UTM 1927,Clarke 1866,Central Meridian=-105,Ref Latitude=0,False Easting=500000,False Northing=0
UTM13N = Zone 13 UTM Northing (meters)
NOX_gps = Estimated Actual Emission Rate as Reported on APEN (grams per second, long-term)
StkH_m = Stack Height (meters)
StkT_K = Stack Gas Exit Temperature (Kelvin)
StkV_mps = Stack Gas Exit Velocity (meters per second)
StkD_m = Stack Diameter (meters)

TITLE:	**1989 Emission Inventory**												
Source ID (SCSE):	**80670158**												
Plant Name (PNME):	**PUBLIC SERVICE CO TIFFANY**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
(3) SUPERIOR 8G825'S	95OPLP078	(3) SUPERIOR 8G825'S		-107.511389	37.050833	276654.6685	4103251.813	670158a	2.646840	5.49	999.67	11.13	0.24
ELASTEC SMARTASH RECOVERY	97LP0890	ELASTEC SMARTASH RECOVERY		-107.511389	37.050833	276685.0423	4103244.344	670158b	0.000288	5.49	533.00	6.10	0.24
								total=	**2.64713**	**g/s =**	**92.01**	**ton/yr**	

TITLE:	**Change in Actual Emissions Between 1989 and 1999 (positive emissions = increment consumption; negative = increment expansion)**												
Source ID (SCSE):	**80670158**												
Plant Name (PNME):		**PUBLIC SERVICE CO TIFFANY**											
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
(3) SUPERIOR 8G825'S	95OPLP078	(3) SUPERIOR 8G825'S		-107.511389	37.050833	276654.6685	4103251.813	670158a	0.000000	5.49	999.67	11.13	0.24
ELASTEC SMARTASH RECOVERY	97LP0890	ELASTEC SMARTASH RECOVERY		-107.511389	37.050833	276685.0423	4103244.344	670158b	0.000000	5.49	533.00	6.10	0.24
								total=	**0.00000**	**g/s =**	**0.00**	**ton/yr**	

15. Source-by-Source PSD Increment Analysis – Williams Field Services Trunk J Site (Scse 086700046)

15.1. Discussion

AIRS unit 001 (Ajax engine) appears to have been installed before the minor source baseline date. Thus, it is considered to be a baseline source. Thus, only changes in actuals emissions between the minor source baseline date (March 30, 1989) and the present affect PSD increment for NO_2. In this case, it has been assumed that the actual emissions reported on the most recent APEN reflect both current and baseline actual emissions. As such, it has been assumed in this study that unit001 does not consume or expand PSD increment. AIRS unit 002 (WAUKESHA L7042 GL) has a permit approval date after the minor source baseline date. "Thus, it is assumed to increment consuming. Point 002 is actually two compressors which are slated to replace the compressor at point 1 and a temporary unit permitted as a portable unit by the rental company. Both points show inventory emissions at this time."[19]

15.2. Location Verfication with USGS Digital Orthophoto Quadrangles (DOQs) and Modeling Results

Facility locations and coordinates have been verified with USGS digital orthophoto quadrangles (DOQs). A DOQ is a computer-generated image of an aerial photograph in which displacements caused by terrain relief and camera tilts have been removed. It combines the image characteristics of a photograph with the geometric qualities of a map. In this case, unit specific coordinates have been digitized in ArcView by comparing the source locations on a plot plan with the orthophoto (see figure on the next page).

The plot plan give corner UTM coordinates which appear to be offset when compared to the road location and the survey line to the section corner. These points were used to generate the plot shape and then it was moved to the correspond with the survey line. [20]

[19] CDPHE/APCD memorandum from Dave Thayer, Stationary Sources Program, to Chuck Machovec, Technical Services Program, March 11, 1999.
[20] CDPHE/APCD memorandum from Dave Thayer, Stationary Sources Program, to Chuck Machovec, Technical Services Program, March 11, 1999.

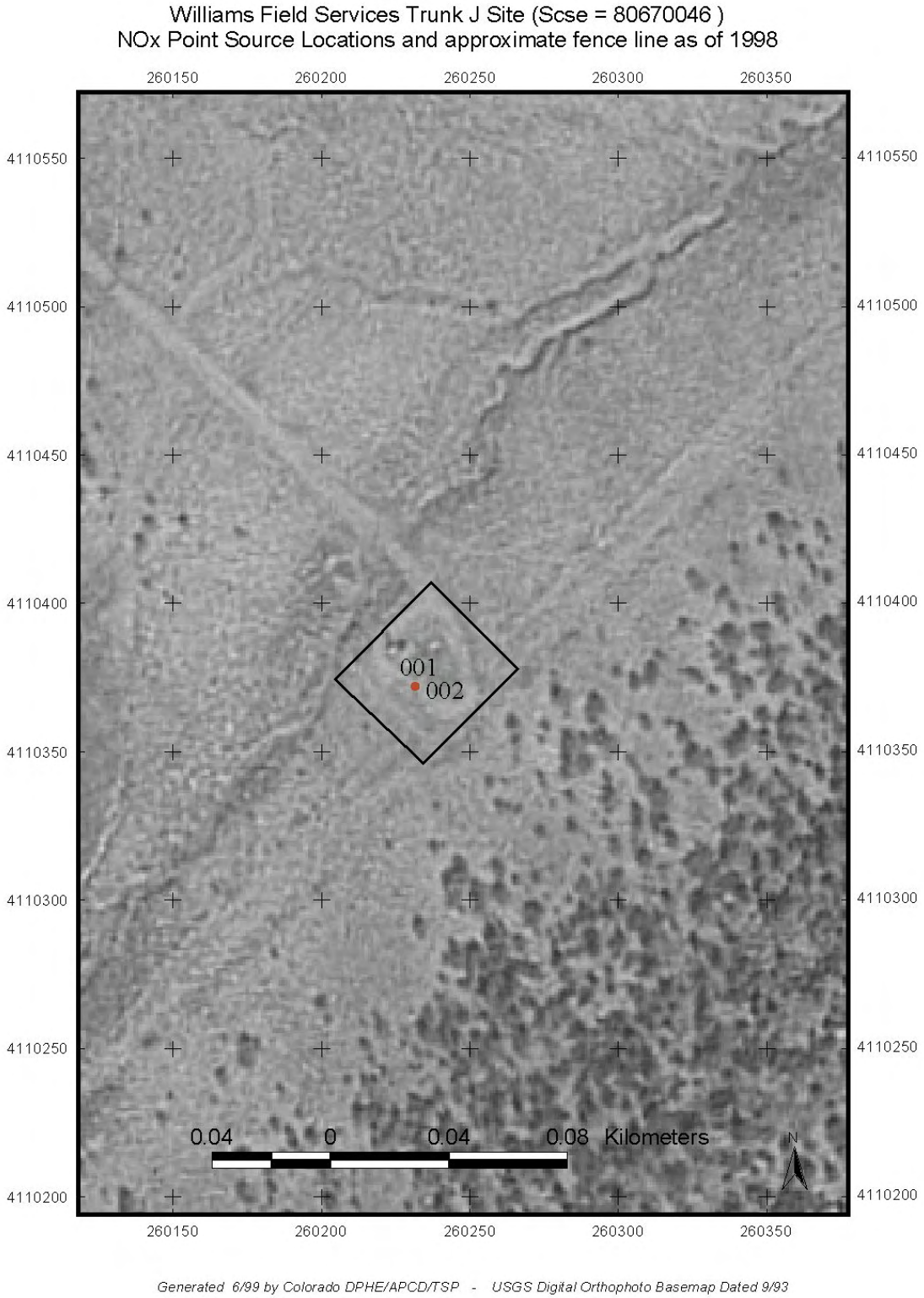


Figure 32. Location of the WFS Trunk J facility on a USGS DOQ.

15.3. Emission Inventory

Table 21. WFS Trunk J (SCSE 080670046) emission inventories.

TITLE:	**1999 Emission Inventory**												
Source ID (SCSE):	**80670046**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
AJAX DPC-600 495HP CMPRSR	88LP380	AJAX DPC-600 495HP ENGINE		-107.698333	37.110833	260231.68	4110372.04	670046a	2.664102	3.66	821.89	7.19	0.12
WAUKESHA L7042 GL	97LP0830	WAUKESHA L7042 GL	98062	-107.698333	37.110833	260231.68	4110372.04	670046b	0.733636	6.71	624.11	31.91	0.31
								total=	**3.39774**	**g/s =**	**118.10**	**ton/yr**	

Key:
SCSE = Plant ID number XXYYYZZZZ where XX=FIPS State, YYY=FIPS County, ZZZZ=NEDS plant Number
PNME = Plant Name
DSC3 = Construction Permit Number
EPDS = Point Description
DSC4 = Segment Description
SD07 = Initial permit approval date [Julian date: YYDDD]
LATITUDE = latitude in decimal degrees
LONGITUDE = longitude in decimal degrees
UTM13E = Zone 13 Universal Tranverse Mercator (UTM) easting (meters)
(UTM 1927,Clarke 1866,Central Meridian=-105,Ref Latitude=0,False Easting=500000,False Northing=0
UTM13N = Zone 13 UTM Northing (meters)
NOX_gps = Estimated Actual Emission Rate as Reported on APEN (grams per second, long-term)
StkH_m = Stack Height (meters)
StkT_K = Stack Gas Exit Temperature (Kelvin)
StkV_mps = Stack Gas Exit Velocity (meters per second)
StkD_m = Stack Diameter (meters)

TITLE:	**1989 Emission Inventory**												
Source ID (SCSE):	**80670046**												
Plant Name (PNME):	**WILLIAMS FIELD SERVICES TRUNK J SITE**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
AJAX DPC-600 495HP CMPRSR	88LP380	AJAX DPC-600 495HP ENGINE		-107.698333	37.110833	260231.68	4110372.04	670046a	2.664102	3.66	821.89	7.19	0.12
								total=	**2.66410**	**g/s =**	**92.60**	**ton/yr**	

TITLE:	**Change in Actual Emissions Between 1989 and 1999 (positive emissions = increment consumption; negative = increment expansion)**												
Source ID (SCSE):	**80670046**												
Plant Name (PNME):	**WILLIAMS FIELD SERVICES TRUNK J SITE**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
AJAX DPC-600 495HP CMPRSR	88LP380	AJAX DPC-600 495HP ENGINE		-107.698333	37.110833	260231.68	4110372.04	670046a	0.000000	3.66	821.89	7.19	0.12
WAUKESHA L7042 GL	97LP0830	WAUKESHA L7042 GL	98062	-107.698333	37.110833	260231.68	4110372.04	670046b	0.733636	6.71	624.11	31.91	0.31
								total=	**0.73364**	**g/s =**	**25.50**	**ton/yr**	

16. Source-by-Source PSD Increment Analysis – Amoco Production Co. Florida River (Scse 08670034)

16.1. Discussion

According to the inspection report in Division files, the compressors previously permitted at this site have been replaced with electrically driven units, so the bulk of the emissions are from dehydration heaters.[21] AIRS units 006 (Amine system heater) and 007 (glycol dehydrator skid#1) have permit approval dates before 1989 and are assumed to be baseline sources. AIRS unit 009 (emergency flare), unit 10 (NG HEATER AMINE 39.96BTUH), unit 012 (Tulda heater), and unit 13 (ICE: WAUKESHA 7042GL) are assumed to have been installed after the minor source baseline data.

For modeling results, this source has been grouped with others at the Williams Field Service Ignacio B Plant and sources from the EPNG and Amoco Florida River Plants. This has been done because of the close proximity of the sources. Refer to the WFS Ignacio B section of this report for results.

16.2. Location Verfication with USGS Digital Orthophoto Quadrangles (DOQs) and Modeling Results

Facility locations and coordinates have been verified with USGS digital orthophoto quadrangles (DOQs). A DOQ is a computer-generated image of an aerial photograph in which displacements caused by terrain relief and camera tilts have been removed. It combines the image characteristics of a photograph with the geometric qualities of a map. In this case, unit specific coordinates have been digitized in ArcView by comparing the source locations on a plot plan with the orthophoto (see figure on the next page).

A plot plan was not available for this site.

[21] CDPHE/APCD memorandum from Dave Thayer, Stationary Sources Program, to Chuck Machovec, Technical Services Program, March 11, 1999.

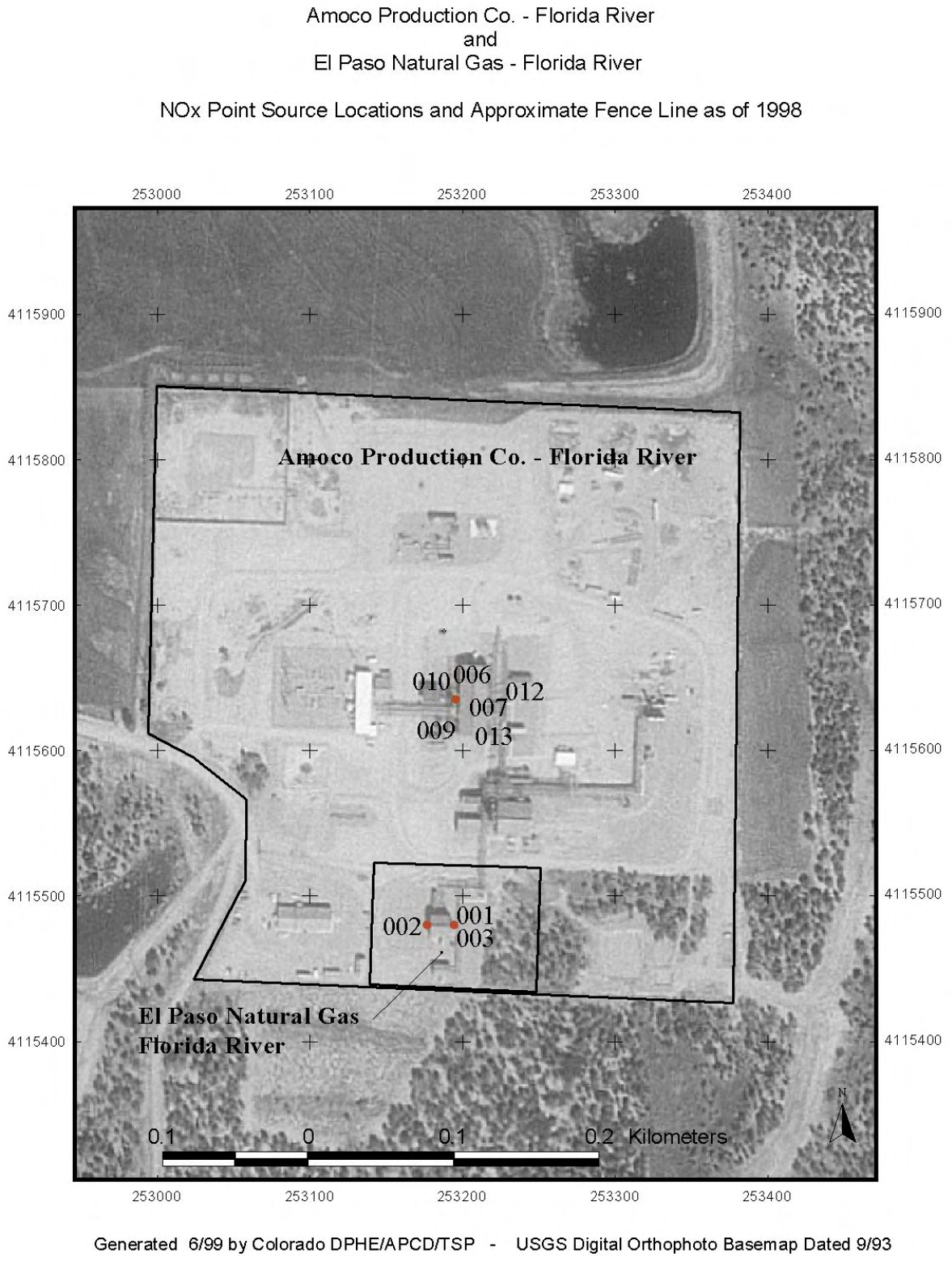


Figure 33. Location of the Amoco Florida River facility on a USGS DOQ.

16.3. Emission Inventory

Table 22. Amoco Florida River (SCSE 080670034) emission inventories.

TITLE:	**1999 Emission Inventory**												
Source ID (SCSE):	**80670034**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
AMINE SYSTEM HEATER	89LP232-1	AMINE SYSTEM HEATER		-107.779167	37.156389	253195.56	4115634.70	670034a	0.785421	26.21	601.33	6.95	1.77
GLYCOL DEHYDRATOR SKID #1	89LP232-2	GLYCOL DEHYDRATOR #1		-107.779167	37.156389	253195.56	4115634.70	670034b	0.241668	10.36	366.33	6.10	0.49
EMERGENCY FLARE-VFOS03 FC	XP	EMERGENCY FLARE_VFOSO3FC		-107.779167	37.156389	253195.56	4115634.70	670034c	0.025418	3.05	294.11	6.10	0.24
TULDA HEATER DN 96222	97LP0410	TULSA HEATER SN: 96222	97170	-107.779167	37.156389	253195.56	4115634.70	670034d	0.100695	27.13	616.33	6.10	0.88
ICE: WAUKESHA 7042GL	98LP0298	NAT. GAS		-107.779167	37.156389	253195.56	4115634.70	670034e	0.253176	6.10	659.11	0.64	0.30
NG HEATER AMINE 39.96BTUH	95LP1051	12 3.33 MMBTU/HR BURNERS		-107.779166	37.156388	253195.21	4115635.37	670034f	1.159431	2.13	602.44	109.15	0.15
								total=	**2.56581**	**g/s =**	**89.18**	**ton/yr**	

Key:
SCSE = Plant ID number XXYYYZZZZ where XX=FIPS State, YYY=FIPS County, ZZZZ=NEDS plant Number
PNME = Plant Name
DSC3 = Construction Permit Number
EPDS = Point Description
DSC4 = Segment Description
SD07 = Initial permit approval date [Julian date: YYDDD]
LATITUDE = latitude in decimal degrees
LONGITUDE = longitude in decimal degrees
UTM13E = Zone 13 Universal Tranverse Mercator (UTM) easting (meters)
(UTM 1927,Clarke 1866,Central Meridian=-105,Ref Latitude=0,False Easting=500000,False Northing=0
UTM13N = Zone 13 UTM Northing (meters)
NOX_gps = Estimated Actual Emission Rate as Reported on APEN (grams per second, long-term)
StkH_m = Stack Height (meters)
StkT_K = Stack Gas Exit Temperature (Kelvin)
StkV_mps = Stack Gas Exit Velocity (meters per second)
StkD_m = Stack Diameter (meters)

TITLE:	**1989 Emission Inventory**												
Source ID (SCSE):	**80670034**												
Plant Name (PNME):	**AMOCO PRODUCTION CO FLORIDA RIVER COMP**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
AMINE SYSTEM HEATER	89LP232-1	AMINE SYSTEM HEATER		-107.779167	37.156389	253195.56	4115634.70	670034a	0.785421	26.21	601.33	6.95	1.77
GLYCOL DEHYDRATOR SKID #1	89LP232-2	GLYCOL DEHYDRATOR #1		-107.779167	37.156389	253195.56	4115634.70	670034b	0.241668	10.36	366.33	6.10	0.49
								total=	**1.02709**	**g/s =**	**35.70**	**ton/yr**	

TITLE:	**Change in Actual Emissions Between 1989 and 1999 (positive emissions = increment consumption; negative = increment expansion)**												
Source ID (SCSE):	**80670034**												
Plant Name (PNME):	**AMOCO PRODUCTION CO FLORIDA RIVER COMP**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
AMINE SYSTEM HEATER	89LP232-1	AMINE SYSTEM HEATER		-107.779167	37.156389	253195.56	4115634.70	670034a	0.000000	26.21	601.33	6.95	1.77
GLYCOL DEHYDRATOR SKID #1	89LP232-2	GLYCOL DEHYDRATOR #1		-107.779167	37.156389	253195.56	4115634.70	670034b	0.000000	10.36	366.33	6.10	0.49
EMERGENCY FLARE-VFOS03 FC	XP	EMERGENCY FLARE_VFOSO3FC		-107.779167	37.156389	253195.56	4115634.70	670034c	0.025418	3.05	294.11	6.10	0.24
TULDA HEATER DN 96222	97LP0410	TULSA HEATER SN: 96222	97170	-107.779167	37.156389	253195.56	4115634.70	670034d	0.100695	27.13	616.33	6.10	0.88
ICE: WAUKESHA 7042GL	98LP0298	NAT. GAS		-107.779167	37.156389	253195.56	4115634.70	670034e	0.253176	6.10	659.11	0.64	0.30
NG HEATER AMINE 39.96BTUH	95LP1051	12 3.33 MMBTU/HR BURNERS		-107.779166	37.156388	253195.21	4115635.37	670034f	1.159431	2.13	602.44	109.15	0.15
								total=	**1.53872**	**g/s =**	**53.48**	**ton/yr**	

17. Source-by-Source PSD Increment Analysis – El Paso Natural Gas Co. Florida River (Scse 0867054)

17.1. Discussion

Both units S001 and S002 were installed after the minor source baseline date of March 30, 1989. Both units consume PSD increment. AIRS lists 3 units at this site. There are only two units according to the Title V permit discussion. AIRS unit 001 was replaced by unit 003 and a new permit was issued. Thus, emissions from unit 001 have been removed from the inventory used in this study even though they are listed in AIRS.

For modeling results, this source has been grouped with others at the Williams Field Service Ignacio B Plant and sources from the EPNG and Amoco Florida River Plants. This has been done because of the close proximity of the sources. Refer to the WFS Ignacio B section of this report for results.

17.2. Excerpts from ORIGINAL "TECHNICAL REVIEW DOCUMENT FOR OPERATING PERMIT 95OPLP0004," Last Revised November 21, 1997

Source Description

This facility is a natural gas compressor station. Natural gas is transported to the station by way of a high-pressure pipeline. Two natural gas fired turbines recompress the natural gas for transportation further down the pipeline. The facility is located in the Southeast Quadrant of the Southwest Quadrant of Section 25, T34N, R9W. It is approximately 10 miles South and West of the city of Durango, Colorado. This facility is located on fee lands within the exterior boundaries of the Southern Ute Indian Reservation. The nearest major road is County Road 307. La Plata county is designated as attainment for all reportable pollutants. The state of New Mexico is within a 50-mile radius of the facility. Additionally, two Federal Class I areas, Mesa Verde National Park and Weminuche Wilderness Area, are located within 100 Kilometers of the facility. The facility has certified that they are not subject to the Accidental Release provisions of section 112(r) of the Clean Air Act. The source is considered to be a minor source (Potential To Emit (PTE) < 250 Tons Per Year (TPY)) for purposes of the Prevention of Significant Deterioration (PSD) program. Facility wide emissions as follows:

Pollutant	Potential to Emit (TPY)	Actual (TPY)
NOx	192.2	124.6
VOC	14.4	1.12
CO	90.7	45.56

Potential emissions are based on emissions calculations supplied in the application and existing construction permits for the regulated units covered by the Operating Permit. Actual emissions are based upon information supplied in the application. This facility is required to provide an updated APEN in the event that emissions of any of the above air pollutants increase 5 tons per year, above the level reported on the last APEN submitted to the APCD. Under the guidelines of EPA's Whitepaper for streamlining the operating permit process, actual emissions for the last data year were not required during the application process. Therefore, the Division assumes that emissions from this facility have remained the same or decreased since the last APEN submittal based upon the compliance certification in the operating permit application.

Emission Sources:
The following sources are specifically regulated under terms and conditions of the Operating Permit for this Site:

Units S001 - Solar Centaur Model Type H (T-5500), S/N: 0228H, Natural Gas Fired Turbine Compressor. Maximum Heat Input Rate of 37.6 mmBTU/Hr. Site Rated at 4150 Hp.
Discussion:
1. Applicable Requirements- S001 was originally permitted under 90LP014-1 which covered a Solar Centaur Type H (T-5700), Serial Number HABAA-0100-210. The unit was replaced and re-permitted under 95LP423. Initial approval was granted for the unit on April 3, 1996. Final Approval was granted on July 29, 1997 and the applicable permit conditions directly incorporated into the Draft Operating Permit.

The following terms and conditions of the Construction Permits have been incorporated into the Draft Operating Permit as Applicable Requirements: Annual and hourly emission limits for NOx, CO, and fuel use limitations; 20% Opacity limit; General and specific provisions of New Source Performance Standards (NSPS) Subpart GG - Standards of Performance for Stationary Gas Turbines as adopted into Colorado Regulation No. 6, Part B (including NOx limitations in parts per million). Limitations from the initial approval permit for VOC and PM10 were dropped upon final approval due to deminimis levels and were therefore not included in the operating permit.

The facility is also required to meet a sulfur dioxide (SO2) standard of 150 PPMVD, as well as a fuel sulfur content of 0.8% by weight. Because the unit is burning natural gas, both of these should easily be met. Compliance with the PPMVD standard will be ensured by using natural gas with a sulfur content less than 0.8% by weight. However, the source is still required to monitor the sulfur content of the fuel. It should be noted that NSPS GG (adopted by reference into Colorado Regulation No. 6, Part B) also requires monitoring of the nitrogen content of the fuel to determine fuel-bound nitrogen allowances. However, the source is claiming no nitrogen allowances under 60.332(a)(1), and therefore monitoring is not needed.

Units S002 - Solar Centaur Model Type H (T-5700), S/N: 93059, Natural Gas Fired

Turbine Compressor. Maximum Heat Input Rate of 38.1 mmBTU/Hr. Site Rated at 4120 Hp.

Discussion:

1. Applicable Requirements- This unit was installed in 1990 and issued initial approval permit number 90LP014-2. The permit was subsequently modified on 2/3/93 and 11/9/93 before receiving final approval on July 5, 1995. The applicable requirements applicable to S001, albeit with different limitations, are applicable to S002. Please see discussion under S001.

2. Emission Factors- As with S001, the emission factors used are based upon testing performed on Solar turbines at the Florida River and other sites. Because the factors are a compilation of numerous tests, the emission factors used are the same as those for S001. An actual test on this turbine was performed on December 6, 1995. The test revealed average hourly NOx levels of 12.6 lbs/hr and CO of 0.369 lbs/hr. These levels are well below the permit limitations and below the emissions calculated by the conservative emission factors.

17.3. Excerpts from REVISED "TECHNICAL REVIEW DOCUMENT FOR OPERATING PERMIT 95OPLP0004," December 22, 1998

Facility wide emissions are as follows:

Pollutant	Potential To Emit (TPY)		
	95OPLP004 Iss. 02/01/98	95OPLP004 Modification #1	Net Change (tpy)
NOx	192.2	192.2	0.0
CO	90.7	90.7	0.0
VOC	14.4	14.4	0.0

Potential emissions from the 02/01/98 operating permit were based upon Colorado Construction Permit limitations. Potential emissions for Modification #1 are based upon the minor modification application dated 11/23/98. Emissions of SO_2, PM, and PM_{10} are negligible from the equipment at this facility. There are no changes in potential emissions as a result of this modification.

3. Modification

Incorporation of Standard Alternative Operating Scenario Engine Replacement Language

a. Emission Permits - All current emission limitations will remain in effect with this modification. Also all current monitoring requirements will remain unchanged.

b. Applicable Requirements Discussion- Since there were no emissions increases associated with this modification, no additional control measures are required. The existing applicable requirements remain in effect.

c. Emission Factors - The current emission factors in the issued Operating Permit will remain in effect.

17.4. Location Verfication with USGS Digital Orthophoto Quadrangles (DOQs) and Modeling Results

Facility locations and coordinates have been verified with USGS digital orthophoto quadrangles (DOQs). A DOQ is a computer-generated image of an aerial photograph in which displacements caused by terrain relief and camera tilts have been removed. It combines the image characteristics of a photograph with the geometric qualities of a map. In this case, unit specific coordinates have been digitized in ArcView by comparing the source locations on a plot plan with the orthophoto (see figure on the next page).

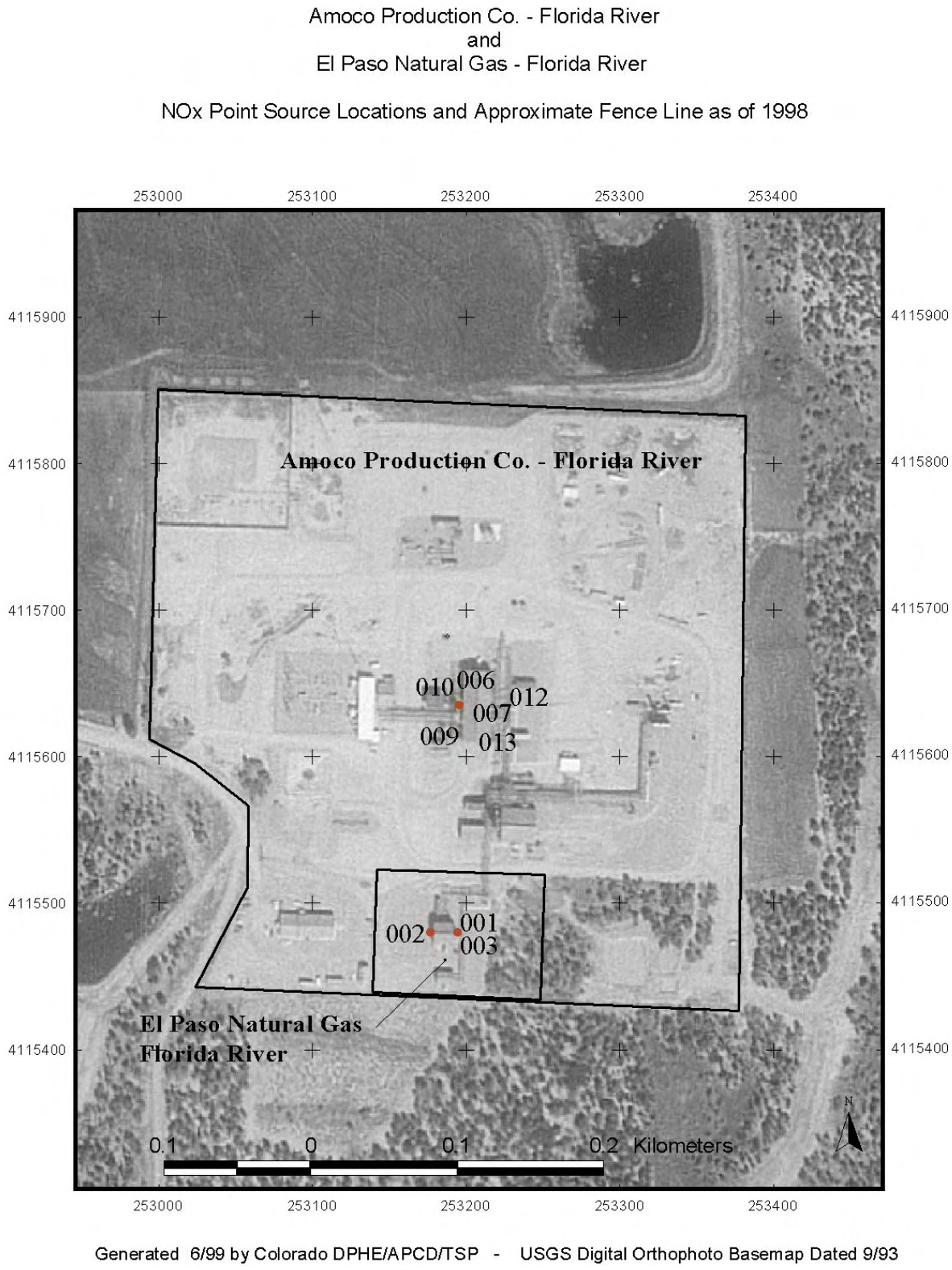


Figure 34. Location of the EPNG Florida River facility on a USGS DOQ.

17.5. Emission Inventory

Table 23. EPNG Florida River (SCSE 080670054) emission inventories.

TITLE:	**1999 Emission Inventory**												
Source ID (SCSE):	**80670054**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
SOLAR CENTAUR TYPE H_5700	90LP014-2	SOLAR CENTAUR TYPE H	93313	-107.77917	37.155	253175.72	4115479.86	670054b	1.609682	10.67	773.56	51.94	1.01
SOLAR CENTAUR	95LP423	SOLAR CENTAUR TYPE HT5500	96093	-107.77917	37.155	253194.04	4115479.86	670054c	1.588104	13.41	794.11	59.74	1.01
								total=	**3.19779**	**g/s =**	**111.15**	**ton/yr**	

Key:
SCSE = Plant ID number XXYYYZZZZ where XX=FIPS State, YYY=FIPS County, ZZZZ=NEDS plant Number
PNME = Plant Name
DSC3 = Construction Permit Number
EPDS = Point Description
DSC4 = Segment Description
SD07 = Initial permit approval date [Julian date: YYDDD]
LATITUDE = latitude in decimal degrees
LONGITUDE = longitude in decimal degrees
UTM13E = Zone 13 Universal Tranverse Mercator (UTM) easting (meters)
(UTM 1927,Clarke 1866,Central Meridian=-105,Ref Latitude=0,False Easting=500000,False Northing=0
UTM13N = Zone 13 UTM Northing (meters)
NOX_gps = Estimated Actual Emission Rate as Reported on APEN (grams per second, long-term)
StkH_m = Stack Height (meters)
StkT_K = Stack Gas Exit Temperature (Kelvin)
StkV_mps = Stack Gas Exit Velocity (meters per second)
StkD_m = Stack Diameter (meters)

TITLE:	**1989 Emission Inventory**												
Source ID (SCSE):	**80670054**												
Plant Name (PNME):	**EL PASO NATURAL GAS CO FLORIDA RIVER CS**												
This source did not exist in 1989.													

TITLE:	**Change in Actual Emissions Between 1989 and 1999 (positive emissions = increment consumption; negative = increment expansion)**												
Source ID (SCSE):	**80670054**												
Plant Name (PNME):	**EL PASO NATURAL GAS CO FLORIDA RIVER CS**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
SOLAR CENTAUR TYPE H_5700	90LP014-2	SOLAR CENTAUR TYPE H	93313	-107.77917	37.155	253175.72	4115479.86	670054b	1.609682	10.67	773.56	51.94	1.01
SOLAR CENTAUR	95LP423	SOLAR CENTAUR TYPE HT5500	96093	-107.77917	37.155	253194.04	4115479.86	670054c	1.588104	13.41	794.11	59.74	1.01
								total=	**3.19779**	**g/s =**	**111.15**	**ton/yr**	

18. Source-by-Source PSD Increment Analysis – Amoco Production Co. Area 7 Injection Sta. (Scse 08670063)

18.1. Discussion

AIRS units 001 and 002 (both CUMMINS GTA-743A 240HP) were permitted after the minor source baseline date. Thus, both units are assumed to be increment consuming in this study.

18.2. Location Verfication with USGS Digital Orthophoto Quadrangles (DOQs) and Modeling Results

Facility locations and coordinates have been verified with USGS digital orthophoto quadrangles (DOQs). A DOQ is a computer-generated image of an aerial photograph in which displacements caused by terrain relief and camera tilts have been removed. It combines the image characteristics of a photograph with the geometric qualities of a map. In this case, unit specific coordinates have been digitized in ArcView by comparing the source locations on a plot plan with the orthophoto (see figure on the next page).

There was no area map provided for this source in the master file, the location chosen was based upon PLSS (Quatering of Section Township and Range) description and examination of the USS aerial photographs. [22]

[22] CDPHE/APCD memorandum from Dave Thayer, Stationary Sources Program, to Chuck Machovec, Technical Services Program, March 11, 1999.

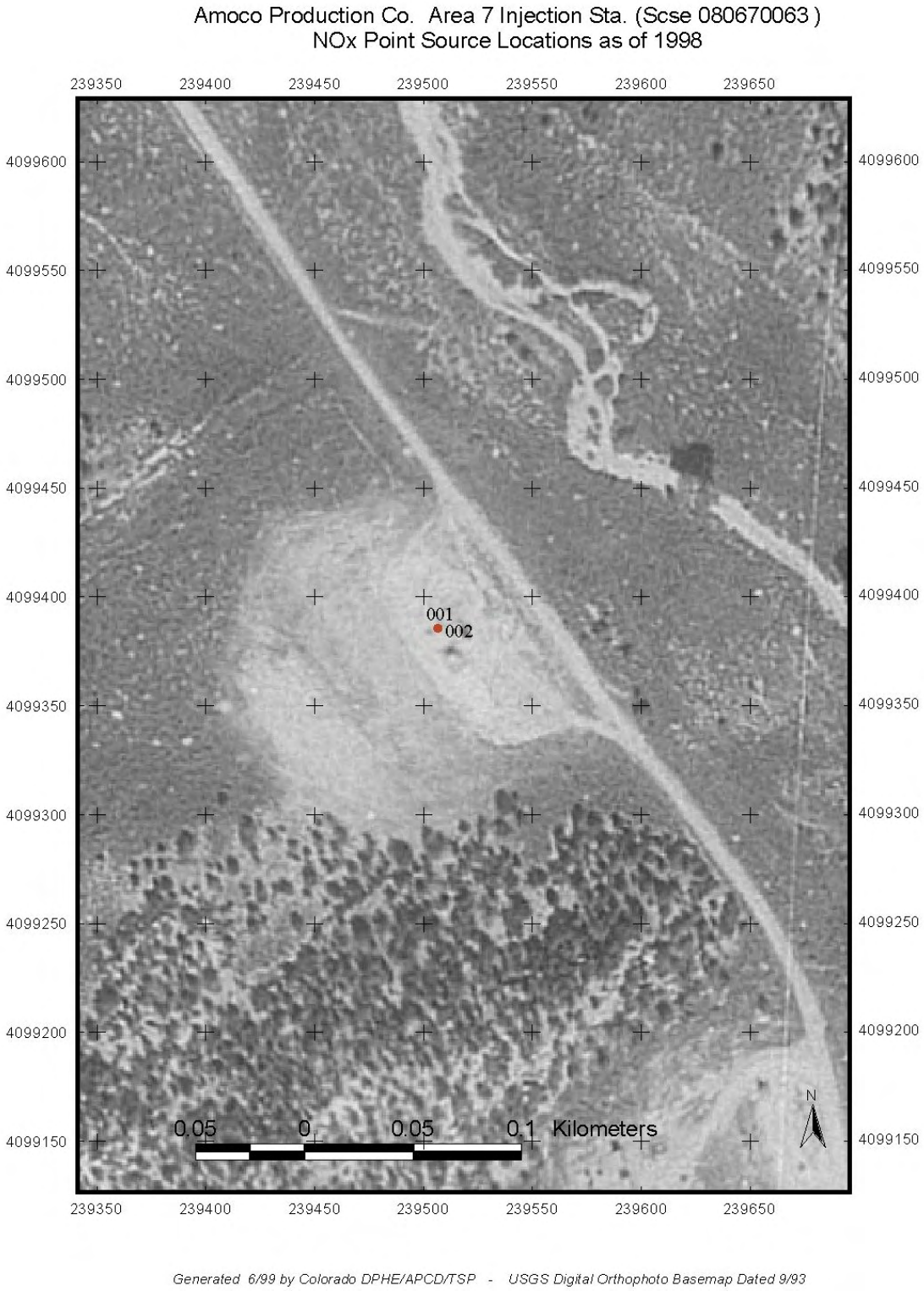


Figure 35. Location of the Amoco Area 7 Injection Station on a USGS DOQ.

18.3. Emission Inventory

Table 24. Amoco Area 7 Injection Sta (SCSE 080670063) emission inventories.

TITLE:	**1999 Emission Inventory**												
Source ID (SCSE):	**80670063**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
CUMMINS GTA-743A 240HP	90LP482-1	CUMMINS GTA-743A 240 HP		-107.9275	37.006389	239506.51	4099385.54	670063a	0.718157	2.44	755.22	31.18	0.12
CUMMINS GTA-743A 240HP	90LP482-2	CUMMINS GTA-743A 240HP		-107.9275	37.006389	239506.51	4099385.54	670063b	0.718157	2.44	755.22	31.18	0.12
								total=	**1.43631**	**g/s =**	**49.92**	**ton/yr**	

Key:
SCSE = Plant ID number XXYYYZZZZ where XX=FIPS State, YYY=FIPS County, ZZZZ=NEDS plant Number
PNME = Plant Name
DSC3 = Construction Permit Number
EPDS = Point Description
DSC4 = Segment Description
SD07 = Initial permit approval date [Julian date: YYDDD]
LATITUDE = latitude in decimal degrees
LONGITUDE = longitude in decimal degrees
UTM13E = Zone 13 Universal Tranverse Mercator (UTM) easting (meters)
(UTM 1927,Clarke 1866,Central Meridian=-105,Ref Latitude=0,False Easting=500000,False Northing=0
UTM13N = Zone 13 UTM Northing (meters)
NOX_gps = Estimated Actual Emission Rate as Reported on APEN (grams per second, long-term)
StkH_m = Stack Height (meters)
StkT_K = Stack Gas Exit Temperature (Kelvin)
StkV_mps = Stack Gas Exit Velocity (meters per second)
StkD_m = Stack Diameter (meters)

TITLE:	**1989 Emission Inventory**												
Source ID (SCSE):	**80670063**												
Plant Name (PNME):	**AMOCO PRODUCTION CO AREA 7 INJECTION STA**												
This source did not exist in 1989.													

TITLE:	**Change in Actual Emissions Between 1989 and 1999 (positive emissions = increment consumption; negative = increment expansion)**												
Source ID (SCSE):	**80670063**												
Plant Name (PNME):	**AMOCO PRODUCTION CO AREA 7 INJECTION STA**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
CUMMINS GTA-743A 240HP	90LP482-1	CUMMINS GTA-743A 240 HP		-107.9275	37.006389	239506.51	4099385.54	670063a	0.718157	2.44	755.22	31.18	0.12
CUMMINS GTA-743A 240HP	90LP482-2	CUMMINS GTA-743A 240HP		-107.9275	37.006389	239506.51	4099385.54	670063b	0.718157	2.44	755.22	31.18	0.12
								total=	**1.43631**	**g/s =**	**49.92**	**ton/yr**	

19. Source-by-Source PSD Increment Analysis – TransColorado Gas Transmission Co. Dolores (Scse 08330019)

19.1. Discussion

AIRS unit 001 (CAT G3612 NAT GAS ENGINE) and 002 (WAUKESHA RATED AT 604 HP) were permitted in 1998. Thus, both units are increment consuming. In the permit review process, one additional CAT G3612 unit was included in the modeling submitted with the application. The AIRS inventory at the end of this section and the overall cumulative impact modeling performed for this study is based on only two existing units listed in AIRS with actual emissions; however, the source-specific results presented in this section include the additional engine.

The modeling for this facility is based on 1993 Val Verde New Mexico meteorological data. A fine receptor grid with 50-meter spacing was used to a distance of 1 kilometer from the facility. Coarse grids of 250 and 500 meters were extended five kilometers from the facility. Receptors were also placed at Mesa Verde National Park which is located about 34 kilometers from this facility. Building downwash was modeled for the auxiliary building, metering skid building, and the compressor building. Terrain elevations are based on 1:24000 DEMs.

The highest modeled annual average in the near-field for NOx is 14.45 $\mu g/m^3$. Using a 75 percent ARM factor to compute NO_2, the maximum impact is 10.8 $\mu g/m^3$. This is below the Class II increment of 25 $\mu g/m^3$. This modeling was performed by the applicant's air quality consultant and approved by the Division. A cumulative increment analysis was not performed as part of the permit process since it is not used as a permit issuance criteria for minor sources under Colorado's current regulations.

The Division performed additional modeling by placing receptors at Mesa Verde. The maximum modeled annual NOx impact based on ISCST3 at Mesa Verde National Park is 0.0013 $\mu g/m^3$. This is below the Class I increment of 2.5 $\mu g/m^3$.

The source-specific results shown here do not include nearby sources. Refer to the overall results section of this report for cumulative impact results performed by the Division.

19.2. Location Verfication with USGS Digital Orthophoto Quadrangles (DOQs) and Modeling Results

Facility locations and coordinates have been verified with USGS digital orthophoto quadrangles (DOQs). A DOQ is a computer-generated image of an aerial photograph in which displacements caused by terrain relief and camera tilts have been removed. It combines the image characteristics of a photograph with the geometric qualities of a map. In this case, unit specific coordinates have been digitized in ArcView by comparing the source locations on a plot plan with the orthophoto (see figure on the next page).

There was no area map provided for this source in the master file, the location chosen was based upon PLSS (Quartering of Section Township and Range) description and examination of the USS aerial photographs. [23]

[23] CDPHE/APCD memorandum from Dave Thayer, Stationary Sources Program, to Chuck Machovec, Technical Services Program, March 11, 1999.

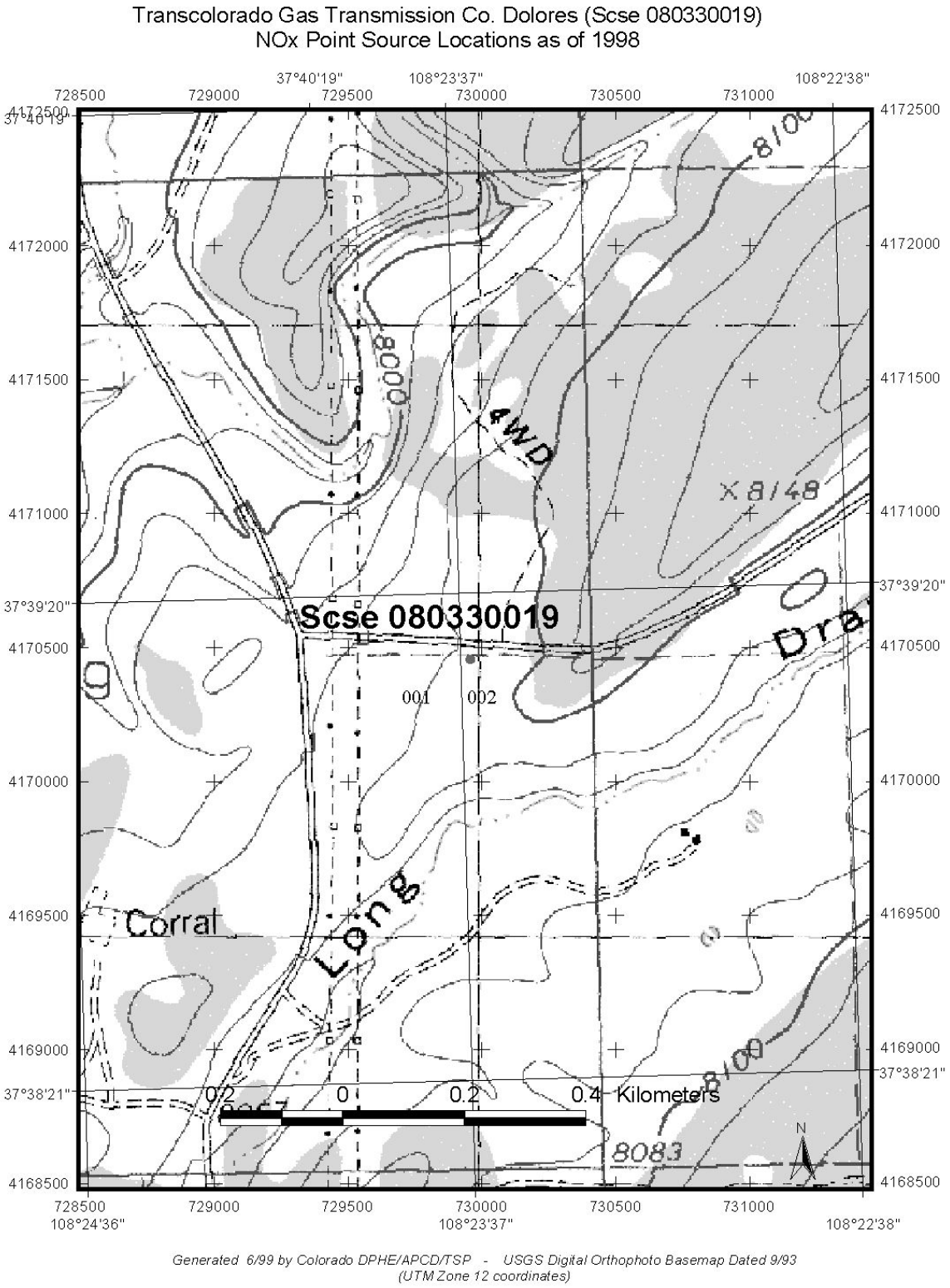


Figure 36. Location of the Transcolorado Dolores facility on a USGS 7.5 minute DRG.

19.3. Emission Inventory

Table 25. Transcolorado Gas Transmission Co. Dolores (SCSE 080670019) emission inventories.

TITLE:	**1999 Emission Inventory**												
Source ID (SCSE):	**80670019**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
CAT G3612 NAT GAS ENGINE	98DO0184	CATERPILLAR G3612	98161	-108.393056	37.654167	200661.59	4172664.29	330019a	0.739388	15.24	644.11	37.34	0.58
WAUKESHA RATED AT 604 HP	98DO0185	WAUKESHA RATED AT 604 HP	98191	-108.393333	37.654444	200661.84	4172664.42	330019b	0.428673	7.92	533.00	43.74	0.24
								total=	**1.16806**	**g/s =**	**40.60**	**ton/yr**	

Key:
SCSE = Plant ID number XXYYYZZZZ where XX=FIPS State, YYY=FIPS County, ZZZZ=NEDS plant Number
PNME = Plant Name
DSC3 = Construction Permit Number
EPDS = Point Description
DSC4 = Segment Description
SD07 = Initial permit approval date [Julian date: YYDDD]
LATITUDE = latitude in decimal degrees
LONGITUDE = longitude in decimal degrees
UTM13E = Zone 13 Universal Tranverse Mercator (UTM) easting (meters)
(UTM 1927,Clarke 1866,Central Meridian=-105,Ref Latitude=0,False Easting=500000,False Northing=0
UTM13N = Zone 13 UTM Northing (meters)
NOX_gps = Estimated Actual Emission Rate as Reported on APEN (grams per second, long-term)
StkH_m = Stack Height (meters)
StkT_K = Stack Gas Exit Temperature (Kelvin)
StkV_mps = Stack Gas Exit Velocity (meters per second)
StkD_m = Stack Diameter (meters)

TITLE:	**1989 Emission Inventory**												
Source ID (SCSE):	**80670019**												
Plant Name (PNME):	**TRANSCOLORADO GAS TRANSMISSION CO DOLORES**												
This source did not exist in 1989.													

TITLE:	**Change in Actual Emissions Between 1989 and 1999 (positive emissions = increment consumption; negative = increment expansion)**												
Source ID (SCSE):	**80670019**												
Plant Name (PNME):	**TRANSCOLORADO GAS TRANSMISSION CO DOLORES**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
CAT G3612 NAT GAS ENGINE	98DO0184	CATERPILLAR G3612	98161	-108.393056	37.654167	200661.59	4172664.29	330019a	0.739388	15.24	644.11	37.34	0.58
WAUKESHA RATED AT 604 HP	98DO0185	WAUKESHA RATED AT 604 HP	98191	-108.393333	37.654444	200661.84	4172664.42	330019b	0.428673	7.92	533.00	43.74	0.24
								total=	**1.16806**	**g/s =**	**40.60**	**ton/yr**	

20. Source-by-Source PSD Increment Analysis – Mid America Pipeline Co. Dolores (Scse 08670033)

20.1. Discussion

The permits for AIRS units 001 (90MN208-1) and unit 002 (90MN208-2.CANC) which appear to have been issued after the minor source baseline date have been canceled. Thus, these two units are considered to be retired increment consuming sources. As such, the emission rates have been set to zero.

The permit for AIRS unit 003 (90MN208-3; turbine #3) appears to have been issued after the minor source baseline date of March 30, 1989. Thus, it is increment consuming.

The permit for AIRS unit 004 (97MN0660; TURBINE #1 MD:10-T1302) was issued after the minor source baseline date and is assumed to be increment consuming. Similarly, the permit for AIRS unit 005 (97MN0661; TURBINE SMB1683 GP20388-3) is increment consuming.

20.2. Location Verfication with USGS Digital Orthophoto Quadrangles (DOQs) and Modeling Results

Facility locations and coordinates have been verified with USGS digital orthophoto quadrangles (DOQs). A DOQ is a computer-generated image of an aerial photograph in which displacements caused by terrain relief and camera tilts have been removed. It combines the image characteristics of a photograph with the geometric qualities of a map. In this case, unit specific coordinates have been digitized in ArcView by comparing the source locations on a plot plan with the orthophoto (see figure on the next page).

Figure 37. Location of the Mid America Dolores facility on a USGS DOQ.

20.3. Emission Inventory

Table 26. Mid America Dolores (SCSE 080670033) emission inventories.

TITLE:	**1999 Emission Inventory**												
Source ID (SCSE):	**80670033**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
TURBINE #1 (SEE PT 004)	90MN208-1.CANC	TURBINE		-108.433	37.416667	196208.78	4146424.87	830033a	0.000000	6.10	749.67	79.95	0.46
TURBINE #2 (SEE PT 005)	90MN208-2.CANC	TURBINE #2		-108.433	37.416667	196208.78	4146424.87	830033b	0.000000	4.27	683.00	70.87	0.46
TURBINE SN:0528521R	90MN208-3	TURBINE #3		-108.433	37.416667	196208.78	4146424.87	830033c	0.466074	6.10	683.00	70.87	0.46
TURBINE #1 MD:10-T1302	97MN0660	TURBINE #1 MD:10-T1302	98034	-108.433	37.416667	196208.78	4146424.87	830033d	0.466074	6.10	749.67	79.95	0.46
TURBINE SMB1683 GP20388-3	97MN0661	TURBINE SMB1683 GP20388-3	98034	-108.433	37.416667	196208.78	4146424.87	830033e	0.466074	6.10	749.67	79.95	0.46
								total=	**1.39822**	**g/s =**	**48.60**	**ton/yr**	

Key:
SCSE = Plant ID number XXYYYZZZZ where XX=FIPS State, YYY=FIPS County, ZZZZ=NEDS plant Number
PNME = Plant Name
DSC3 = Construction Permit Number
EPDS = Point Description
DSC4 = Segment Description
SD07 = Initial permit approval date [Julian date: YYDDD]
LATITUDE = latitude in decimal degrees
LONGITUDE = longitude in decimal degrees
UTM13E = Zone 13 Universal Tranverse Mercator (UTM) easting (meters)
(UTM 1927,Clarke 1866,Central Meridian=-105,Ref Latitude=0,False Easting=500000,False Northing=0
UTM13N = Zone 13 UTM Northing (meters)
NOX_gps = Estimated Actual Emission Rate as Reported on APEN (grams per second, long-term)
StkH_m = Stack Height (meters)
StkT_K = Stack Gas Exit Temperature (Kelvin)
StkV_mps = Stack Gas Exit Velocity (meters per second)
StkD_m = Stack Diameter (meters)

TITLE:	**1989 Emission Inventory**												
Source ID (SCSE):	**80670033**												
Plant Name (PNME):	**MID AMERICA PIPELINE CO DOLORES STA**												
This source did not exist in 1989.													

TITLE:	**Change in Actual Emissions Between 1989 and 1999 (positive emissions = increment consumption; negative = increment expansion)**												
Source ID (SCSE):	**80670033**												
Plant Name (PNME):	**MID AMERICA PIPELINE CO DOLORES STA**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
TURBINE #1 (SEE PT 004)	90MN208-1.CANC	TURBINE		-108.433	37.416667	196208.78	4146424.87	830033a	0.000000	6.10	749.67	79.95	0.46
TURBINE #2 (SEE PT 005)	90MN208-2.CANC	TURBINE #2		-108.433	37.416667	196208.78	4146424.87	830033b	0.000000	4.27	683.00	70.87	0.46
TURBINE SN:0528521R	90MN208-3	TURBINE #3		-108.433	37.416667	196208.78	4146424.87	830033c	0.466074	6.10	683.00	70.87	0.46
TURBINE #1 MD:10-T1302	97MN0660	TURBINE #1 MD:10-T1302	98034	-108.433	37.416667	196208.78	4146424.87	830033d	0.466074	6.10	749.67	79.95	0.46
TURBINE SMB1683 GP20388-3	97MN0661	TURBINE SMB1683 GP20388-3	98034	-108.433	37.416667	196208.78	4146424.87	830033e	0.466074	6.10	749.67	79.95	0.46
								total=	**1.39822**	**g/s =**	**48.60**	**ton/yr**	

21. Source-by-Source PSD Increment Analysis – Red Cedar Gas Gathering (Scse 08670166)

21.1. Discussion

All units have permit approval dates after the minor source baseline date according to AIRS. Thus, it has been assumed in this study that all units are increment consuming.

21.2. Location Verfication with USGS Digital Orthophoto Quadrangles (DOQs) and Modeling Results

Facility locations and coordinates have been verified with USGS digital orthophoto quadrangles (DOQs). A DOQ is a computer-generated image of an aerial photograph in which displacements caused by terrain relief and camera tilts have been removed. It combines the image characteristics of a photograph with the geometric qualities of a map. In this case, unit specific coordinates have been digitized in ArcView by comparing the source locations on a plot plan with the orthophoto (see figure on the next page).

There was no area map provided in the master file. Thus, the location chosen was based upon PLSS description and examination of the USGS aerial photographs.

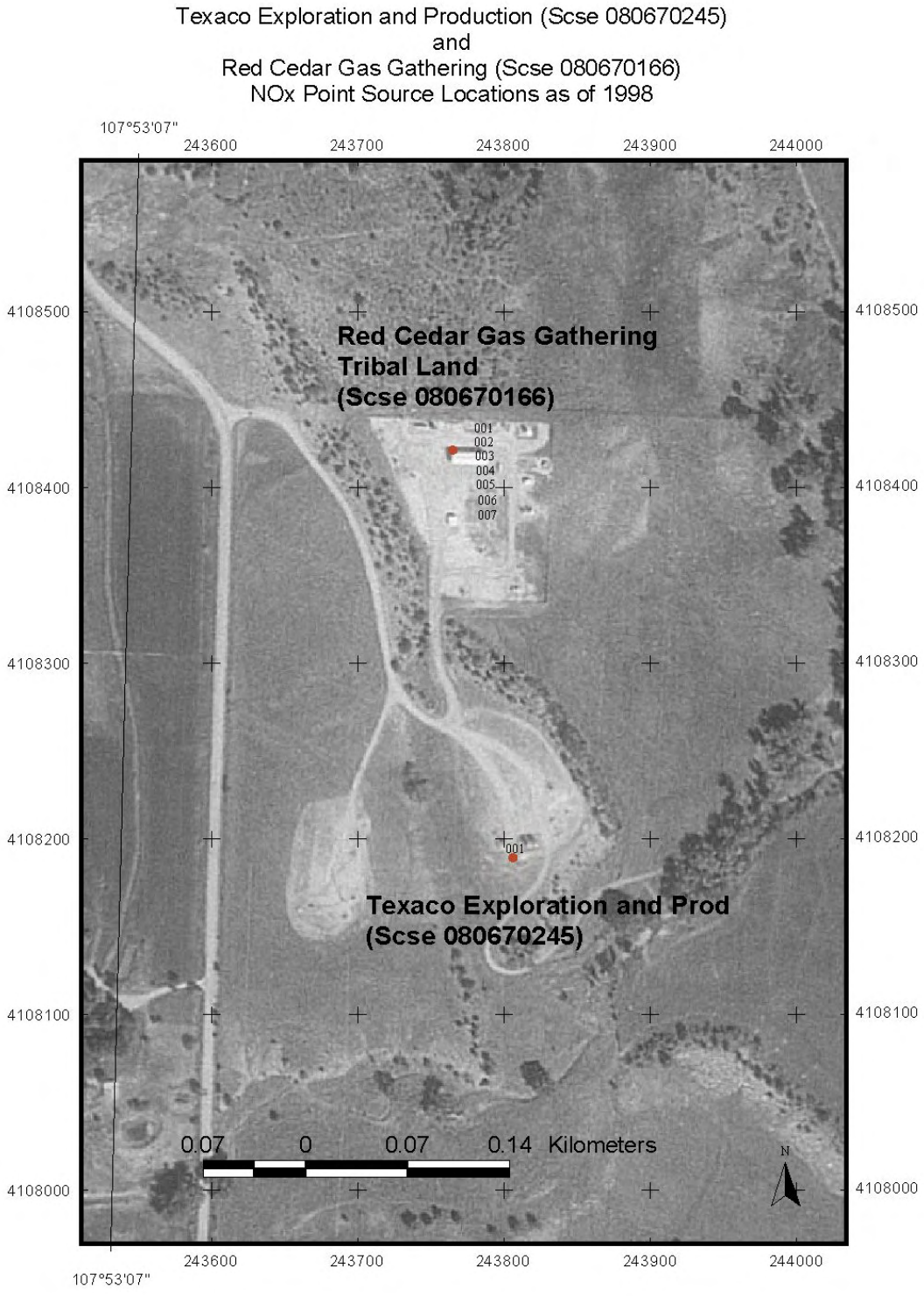


Figure 38. Location of a Red Cedar Gathering facility on a USGS DOQ.

21.3. Emission Inventory

Table 27. Red Cedar Gathering (SCSE 080670166) emission inventories.

TITLE:	**1999 Emission Inventory**												
Source ID (SCSE):	**80670166**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
TRIBAL LAND	94LP152-1	TRIBAL LAND	95054	-107.882778	37.089167	243765.58	4108449.86	670166a	0.296739	4.88	644.11	63.15	0.30
TRIBAL LAND	94LP152-2	WAUKESHA MOD L7042GL CLNB	95054	-107.882778	37.089167	243765.58	4108449.86	670166b	0.374676	5.49	658.00	70.47	2.13
TRIBAL LAND	94LP152-3	WAUKESHA MOD L7042GL CLNB	95054	-107.882778	37.089167	243765.58	4108449.86	670166c	0.374676	5.49	658.00	70.47	0.21
TRIBAL LAND	94LP152-4	GENERAC 74GN MOD CGO70	95054	-107.882778	37.089167	243765.58	4108449.86	670166d	0.418288	4.57	644.11	96.96	0.61
TRIBAL LAND	94LP152-5	GENERAL 74GN MOD OG070	95054	-107.882778	37.089167	243765.58	4108449.86	670166e	0.418288	4.57	644.11	97.02	0.61
TRIBAL LAND	94LP152-6	GLYCOL DEHYDRATOR NAT GAS	94054	-107.882778	37.089167	243765.58	4108449.86	670166f	0.010622	5.49	866.33	45.72	0.46
TRIBAL LAND	94LP152-7	GLY DEHY/TRIETHLYENE GLYC	94054	-107.882778	37.089167	243765.58	4108449.86	670166g	0.033193	5.49	866.33	6.10	0.46
								total=	**1.92648**	**g/s =**	**66.96**	**ton/yr**	

Key:
SCSE = Plant ID number XXYYYZZZZ where XX=FIPS State, YYY=FIPS County, ZZZZ=NEDS plant Number
PNME = Plant Name
DSC3 = Construction Permit Number
EPDS = Point Description
DSC4 = Segment Description
SD07 = Initial permit approval date [Julian date: YYDDD]
LATITUDE = latitude in decimal degrees
LONGITUDE = longitude in decimal degrees
UTM13E = Zone 13 Universal Tranverse Mercator (UTM) easting (meters)
(UTM 1927,Clarke 1866,Central Meridian=-105,Ref Latitude=0,False Easting=500000,False Northing=0
UTM13N = Zone 13 UTM Northing (meters)
NOX_gps = Estimated Actual Emission Rate as Reported on APEN (grams per second, long-term)
StkH_m = Stack Height (meters)
StkT_K = Stack Gas Exit Temperature (Kelvin)
StkV_mps = Stack Gas Exit Velocity (meters per second)
StkD_m = Stack Diameter (meters)

TITLE:	**1989 Emission Inventory**												
Source ID (SCSE):	**80670166**												
Plant Name (PNME):	**RED CEDAR GAS GATHERING**												
This source did not exist in 1989.													

TITLE:	**Change in Actual Emissions Between 1989 and 1999 (positive emissions = increment consumption; negative = increment expansion)**												
Source ID (SCSE):	**80670166**												
Plant Name (PNME):	**RED CEDAR GAS GATHERING**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
TRIBAL LAND	94LP152-1	TRIBAL LAND	95054	-107.882778	37.089167	243765.58	4108449.86	670166a	0.296739	4.88	644.11	63.15	0.30
TRIBAL LAND	94LP152-2	WAUKESHA MOD L7042GL CLNB	95054	-107.882778	37.089167	243765.58	4108449.86	670166b	0.374676	5.49	658.00	70.47	2.13
TRIBAL LAND	94LP152-3	WAUKESHA MOD L7042GL CLNB	95054	-107.882778	37.089167	243765.58	4108449.86	670166c	0.374676	5.49	658.00	70.47	0.21
TRIBAL LAND	94LP152-4	GENERAC 74GN MOD CGO70	95054	-107.882778	37.089167	243765.58	4108449.86	670166d	0.418288	4.57	644.11	96.96	0.61
TRIBAL LAND	94LP152-5	GENERAL 74GN MOD OG070	95054	-107.882778	37.089167	243765.58	4108449.86	670166e	0.418288	4.57	644.11	97.02	0.61
TRIBAL LAND	94LP152-6	GLYCOL DEHYDRATOR NAT GAS	94054	-107.882778	37.089167	243765.58	4108449.86	670166f	0.010622	5.49	866.33	45.72	0.46
TRIBAL LAND	94LP152-7	GLY DEHY/TRIETHLYENE GLYC	94054	-107.882778	37.089167	243765.58	4108449.86	670166g	0.033193	5.49	866.33	6.10	0.46
								total=	**1.92648**	**g/s =**	**66.96**	**ton/yr**	

22. Source-by-Source PSD Increment Analysis – Hallwood Petroleum (Scse 08670074)

22.1. Discussion

All units have permit approval dates after the minor source baseline date according to AIRS. Thus, it has been assumed in this study that all units are increment consuming. The permit for AIRS unit 002 (93LP1372) has been canceled. Thus, only units 001 (AJAX DPC-600 ENGINE) and 004 (CATERPILLAR G3512LE 7532) are assumed to be operating and consuming increment.

22.2. Location Verfication with USGS Digital Orthophoto Quadrangles (DOQs) and Modeling Results

Facility locations and coordinates have been verified with USGS digital orthophoto quadrangles (DOQs). A DOQ is a computer-generated image of an aerial photograph in which displacements caused by terrain relief and camera tilts have been removed. It combines the image characteristics of a photograph with the geometric qualities of a map. In this case, unit specific coordinates have been digitized in ArcView by comparing the source locations on a plot plan with the orthophoto (see figure on the next page).

Figure 39. Location of a Hallwood Petroleum facility on a USGS DOQ.

22.3. Emission Inventory

Table 28. Hallwood Petroleum (SCSE 080670074) emission inventories.

TITLE:	**1999 Emission Inventory**												
Source ID (SCSE):	**080670074**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
AJAX DPC-600, SN: 82-093P	91LP491	AJAX DPC-600 ENGINE	97341	-107.801111	37.253333	251,556.14	4,126,463.75	670074a	0.850513	7.62	505.22	13.50	0.43
COOPER AJAX DPC SN:83937	93LP1372.CANC	COOPER, SN: 83937, ENGINE	93321	-107.801111	37.253333	251,555.82	4,126,463.83	670074b	0.000000	4.57	521.89	12.68	0.37
CATERPILLAR G3512LE 7532	97LP0669	CATERPILLAR G3512LE 7532	97341	-107.801111	37.253333	251,555.86	4,126,463.80	670074c	0.851592	7.62	644.11	14.39	0.43
								total=	**1.70211**	**g/s =**	**59.16**	**ton/yr**	

Key:
SCSE = Plant ID number XXYYYZZZZ where XX=FIPS State, YYY=FIPS County, ZZZZ=NEDS plant Number
PNME = Plant Name
DSC3 = Construction Permit Number
EPDS = Point Description
DSC4 = Segment Description
SD07 = Initial permit approval date [Julian date: YYDDD]
LATITUDE = latitude in decimal degrees
LONGITUDE = longitude in decimal degrees
UTM13E = Zone 13 Universal Tranverse Mercator (UTM) easting (meters)
(UTM 1927,Clarke 1866,Central Meridian=-105,Ref Latitude=0,False Easting=500000,False Northing=0
UTM13N = Zone 13 UTM Northing (meters)
NOX_gps = Estimated Actual Emission Rate as Reported on APEN (grams per second, long-term)
StkH_m = Stack Height (meters)
StkT_K = Stack Gas Exit Temperature (Kelvin)
StkV_mps = Stack Gas Exit Velocity (meters per second)
StkD_m = Stack Diameter (meters)

TITLE:	**1989 Emission Inventory**												
Source ID (SCSE):	**080670074**												
Plant Name (PNME):	**44 CANYON LLC, C/O HALLWOOD PETROLEUM**												
This source did not exist in 1989.													

TITLE:	**Change in Actual Emissions Between 1989 and 1999 (positive emissions = increment consumption; negative = increment expansion)**												
Source ID (SCSE):	**080670074**												
Plant Name (PNME):	**44 CANYON LLC, C/O HALLWOOD PETROLEUM**												
DSC3	EPDS	DSC4	SD07	LONGITUDE	LATITUDE	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
AJAX DPC-600, SN: 82-093P	91LP491	AJAX DPC-600 ENGINE	97341	-107.801111	37.253333	251,556.14	4,126,463.75	670074a	0.850513	7.62	505.22	13.50	0.43
COOPER AJAX DPC SN:83937	93LP1372.CANC	COOPER, SN: 83937, ENGINE	93321	-107.801111	37.253333	251,555.82	4,126,463.83	670074b	0.000000	4.57	521.89	12.68	0.37
CATERPILLAR G3512LE 7532	97LP0669	CATERPILLAR G3512LE 7532	97341	-107.801111	37.253333	251,555.86	4,126,463.80	670074c	0.851592	7.62	644.11	14.39	0.43
								total=	**1.70211**	**g/s =**	**59.16**	**ton/yr**	

23. Source-by-Source PSD Increment Analysis for Facilities Emitting >20 tpy but less than 40 tpy in Colorado

This section provides a summary of emissions from smaller sources in the Colorado portion of the study area that have undergone some quality assurance checks by the Division. Specifically, it includes sources with NOx emissions greater than 20 tons per year but less than about 40 tons per year. The geographic coordinates of these facilities have been checked to make sure that at least the facility-wide coordinate is approximately correct.

The increment status of each unit is presented in the following table. This table includes only sources downloaded from AIRS by the Division. Other large sources exist on Southern Ute lands that are apparently not in AIRS. To account for sources not in AIRS, the Division obtained preliminary emission inventory data from the draft SUIT EIS project; please refer to the section 26 - **Stationary Sources in the Emission Inventory Not Discussed in Earlier Sections of this Report** - for a listing of sources not found in AIRS. The table in section 26 also includes small sources from AIRS that emit less than 20 tons per year.

DOQs used to check coordinates for each of these sources are shown at the end of this section.

Table 29. Emissions from smaller sources in the Colorado portion of the study area that emit > 20 tpy but less than 40 tpy of NOx.

Status	SCSE	PNME	DSC3	EPDS	SD07	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
increment consuming	080670094	WILLIAMS FIELD SVCS IGNACIO 33 7 SITE	WAUKESHA MODEL 1905 170HP	92LP277-1		267547.81	4107791.96	670094a	0.566769	2.13	865.22	0.64	0.12
retired incr consumer	080670094	WILLIAMS FIELD SVCS IGNACIO 33 7 SITE	CATERPILLAR 3304 70HP ICE	92LP277-2.CANC		267547.81	4107791.96	670094b	0.000000	2.13	844.11	15.24	0.10
							FACILITY	**TOTAL=**	**0.566769**	**gps =**	**19.70**	**tpy**	
retired incr consumer	080670062	AMOCO PRODUCTION CO HIGH FLUME CS,AREA 6	WAUKESHA L7042GL 862HP	90LP469-1.CANC		242251.18	4109853.54	670062a	0.000000	7.01	658.00	29.96	0.34
increment consuming	080670062	AMOCO PRODUCTION CO HIGH FLUME CS,AREA 6	WAUKESHA L7042 GL	95LP1008		242251.18	4109853.54	670062b	0.719250	6.40	658.00	50.41	0.30
increment consuming	080670062	AMOCO PRODUCTION CO HIGH FLUME CS,AREA 6	WAUKESHA 3521GL	96LP433	96291	242251.18	4109853.54	670062c	0.316213	4.88	533.00	50.29	0.21
							FACILITY	**TOTAL=**	**1.035463**	**gps =**	**35.99**	**tpy**	
retired baseline	080670032	AMOCO PRODUCTION CO SALVADOR COMP STA	AJAX DPC-180 SALVADOR1	88LP048-1.CANC		267222.61	4106752.18	670032a	0.000000	6.10	644.11	7.19	0.37
retired baseline	080670032	AMOCO PRODUCTION CO SALVADOR COMP STA	AJAX DPC-360 #80750 ENG.	88LP048-7.CANC		267222.61	4106752.18	670032b	0.000000	0.91	644.11	7.19	0.37
retired baseline	080670032	AMOCO PRODUCTION CO SALVADOR COMP STA	WAUKESHA L7042GL 1000HP	88LP095.CANC		267222.61	4106752.18	670032c	0.000000	4.57	533.00	21.12	0.37
increment consuming	080670032	AMOCO PRODUCTION CO SALVADOR COMP STA	WAUKESHA L9390 GL 1460 HP	96LP544	97094	267222.61	4106752.18	670032d	0.811314	0.91	533.00	19.02	0.37
							FACILITY	**TOTAL=**	**0.811314**	**gps =**	**28.20**	**tpy**	
increment consuming	080670082	AMOCO PRODUCTION CO REA 1 DISPSL	WAUKESHA 225HP N.GAS ENG.	93LP400	93388	256261.57	4114064.58	670082a	0.695765	2.44	533.00	31.15	0.12
							FACILITY	**TOTAL=**	**0.695765**	**gps =**	**24.18**	**tpy**	
increment consuming	080670199	AMOCO PRODUCTION CO	CUMMING, MODEL G-855	94LP641		262251.84	4123271.34	670199a	0.940110	2.44	533.00	25.39	1.22
								TOTAL=	**0.940110**	**gps =**	**32.68**	**tpy**	
increment consuming	080670099	44 CANYON LLC C/O HALLWOOD PETROLEUM INC	AJAX DPC 300, SN: 75514	93LP072-1	93058	240959.48	4111250.70	670099a	0.304962	5.49	521.89	13.72	0.24
increment consuming	080670099	44 CANYON LLC C/O HALLWOOD PETROLEUM INC	FORD CSG-649 46 HP	93LP072-3.XP	93058	240959.48	4111250.70	670099b	0.129724	0.61	644.11	151.18	0.09
retired incr consumer	080670099	44 CANYON LLC C/O HALLWOOD PETROLEUM INC	AJAX DPC-180 COMP. ENGINE	96AD642.CANC		240959.48	4111250.70	670099c	0.000000	6.10	510.78	6.80	0.34
increment consuming	080670099	44 CANYON LLC C/O	AJAX DPC 360	97LP0670	97341	240959.48	4111250.70	670099d	0.414917	6.71	533.00	15.15	0.34

		HALLWOOD PETROLEUM INC	LE										
							FACILITY	**TOTAL=**	**0.849603**	**gps =**	**29.53**	**tpy**	
retired incr consumer	080670238	SG INTEREST I LTD	WAUKESHA L 3711G_SN:4068	96LP462.CANC	96345	259974.41	4109145.42	670238a	0.000000	3.66	294.11	42.15	0.16
							FACILITY	**TOTAL=**	**0.000000**	**gps =**	**0.00**	**tpy**	
increment consuming	080670243	PETROGULF CORP	AJAX DPC 230 HP SN 402341	96LP788	97107	238338.19	4108801.48	670243a	0.710619	6.10	516.33	13.32	0.30
							FACILITY	**TOTAL=**	**0.710619**	**gps =**	**24.70**	**tpy**	
increment consuming	080670245	TEXACO EXPLORATION & PROD INC	CAT G399 TALE 59C01159	97LP0065	97160	243806.59	4108170.93	670245a	0.586518	6.40	533.00	77.45	0.21
							FACILITY	**TOTAL=**	**0.586518**	**gps =**	**20.39**	**tpy**	
increment consuming	080670248	AMOCO PRODUCTION CO	CATERPILLAR G34212LE	97LP0550	97302	237223.33	4099178.43	670248a	0.313593	5.49	533.00	46.57	0.30
retired incr consumer	080670248	AMOCO PRODUCTION CO	CATERPILLAR G34212LE	97LP0551.CANC (NOT USED)	97302	237223.33	4099178.43	670248a	0.000000	5.49	533.00	46.57	0.30
							FACILITY	**TOTAL=**	**0.313593**	**gps =**	**10.90**	**tpy**	
increment consuming	080670095	EMERALD GAS OPERATING CO	AJAX DPC-360 ENGINE	92LP598		227548.13	4105378.26	670095a	0.900500	6.10	644.11	40.84	0.25
							FACILITY	**TOTAL=**	**0.900500**	**gps =**	**31.30**	**tpy**	
retired baseline	081050001	US FOREST INDUSTRIES INC	WOOD WASTE WIGWAM BURNER	88RG148-1.CANC 5/95		357053.06	4170325.23	050001a	0.000000	27.43	866.33	6.10	6.10
							FACILITY	**TOTAL=**	**0.000000**	**gps =**	**0.00**	**tpy**	

Key:
SCSE = Plant ID number XXYYYZZZZ where XX=FIPS State, YYY=FIPS County, ZZZZ=NEDS plant Number
PNME = Plant Name
DSC3 = Construction Permit Number
EPDS = Point Description
DSC4 = Segment Description
SD07 = Initial permit approval date [Julian date: YYDDD]
LATITUDE = latitude in decimal degrees
LONGITUDE = longitude in decimal degrees
UTM13E = Zone 13 Universal Tranverse Mercator (UTM) easting (meters)
(UTM 1927,Clarke 1866,Central Meridian=-105,Ref Latitude=0,False Easting=500000,False Northing=0
UTM13N = Zone 13 UTM Northing (meters)
NOX_gps = Estimated Actual Emission Rate as Reported on APEN (grams per second, long-term)
StkH_m = Stack Height (meters)
StkT_K = Stack Gas Exit Temperature (Kelvin)
StkV_mps = Stack Gas Exit Velocity (meters per second)
StkD_m = Stack Diameter (meters)

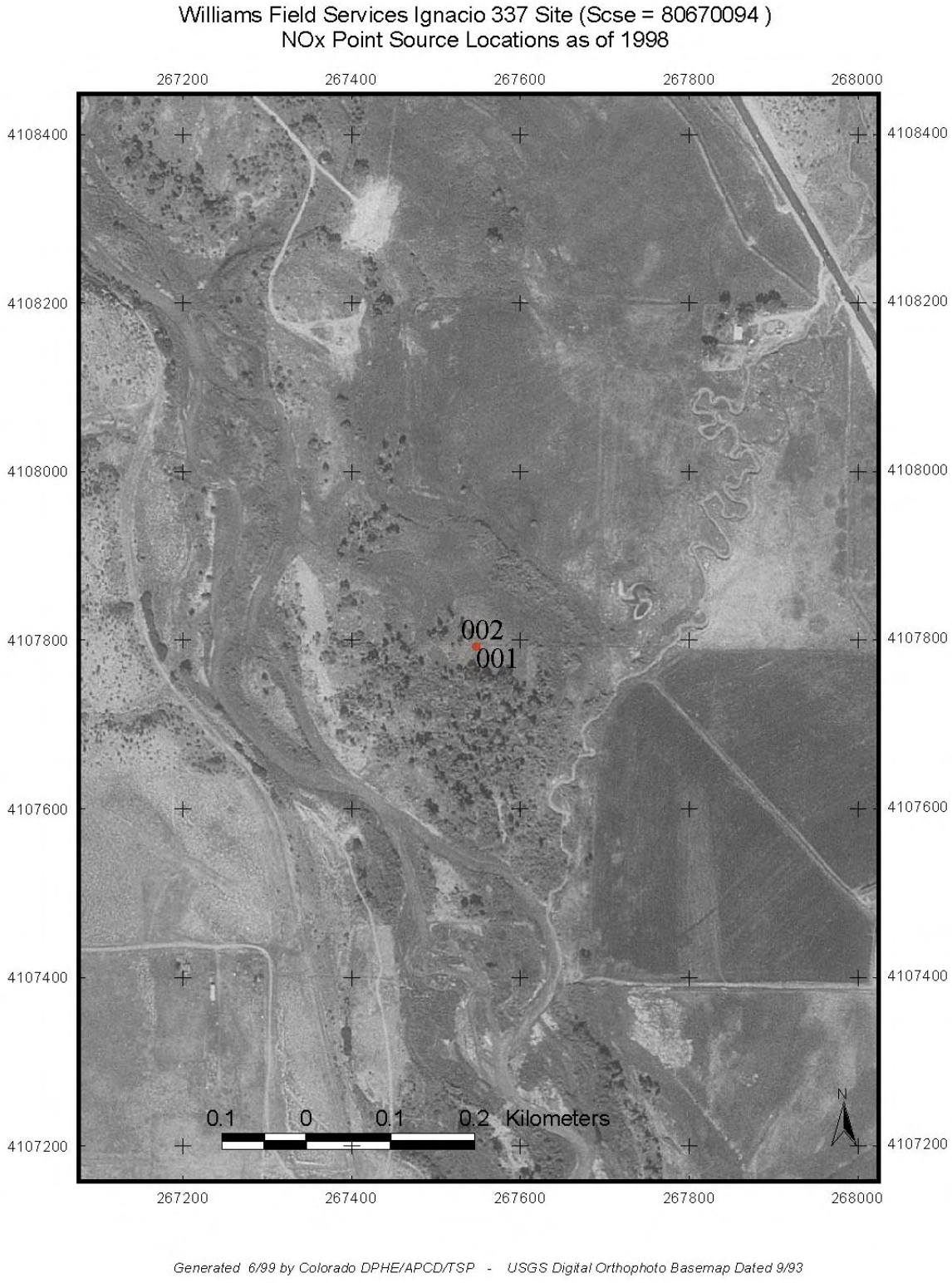


Figure 40. Source location on a USGS DOQ: WFS Ignacio 337 – SCSE 080670094.

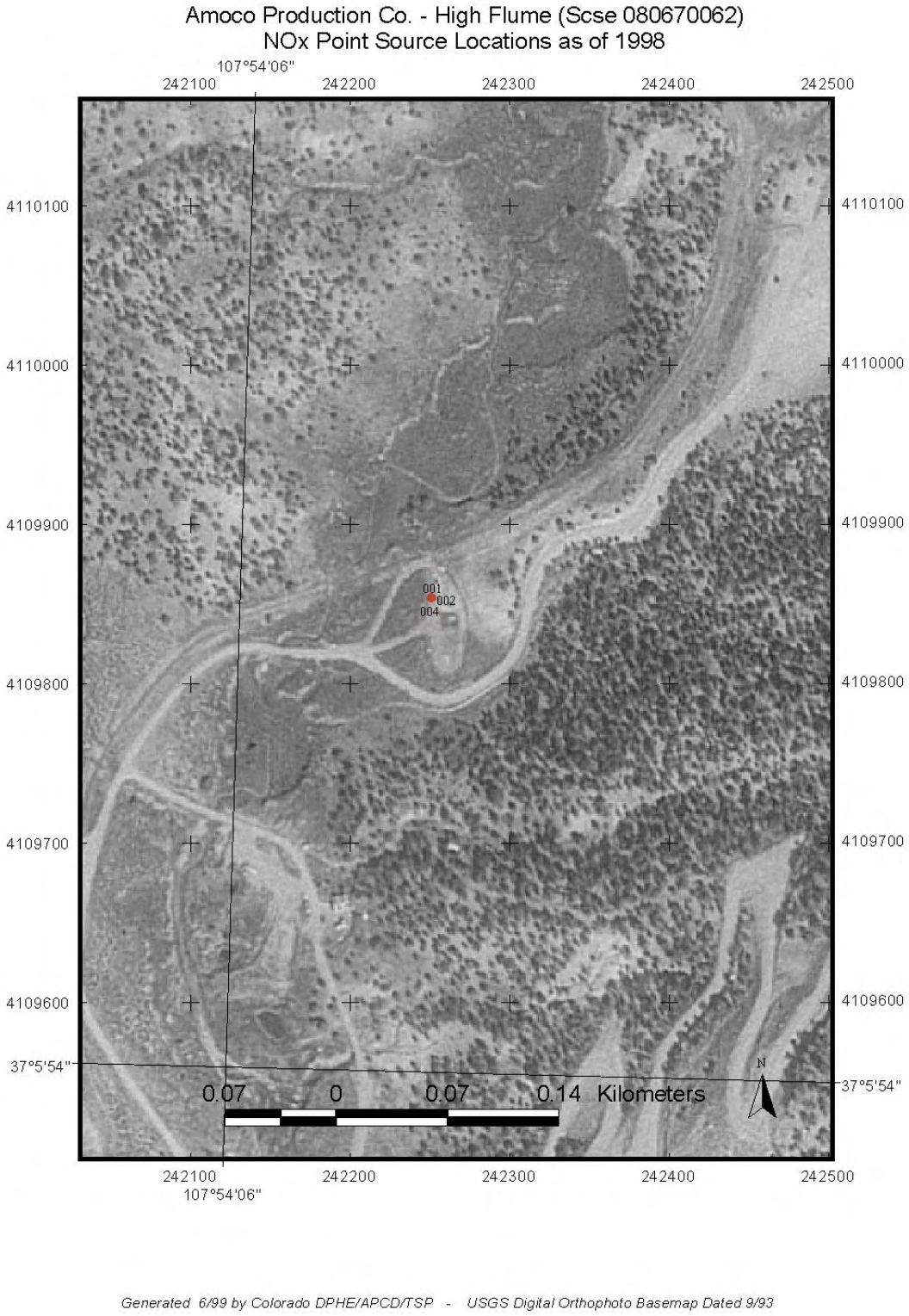


Figure 41. Source location on a USGS DOQ: Amoco High Flume – SCSE 080670062.

Figure 42. Source location on a USGS DOQ: Amoco Salvador – SCSE 080670032.

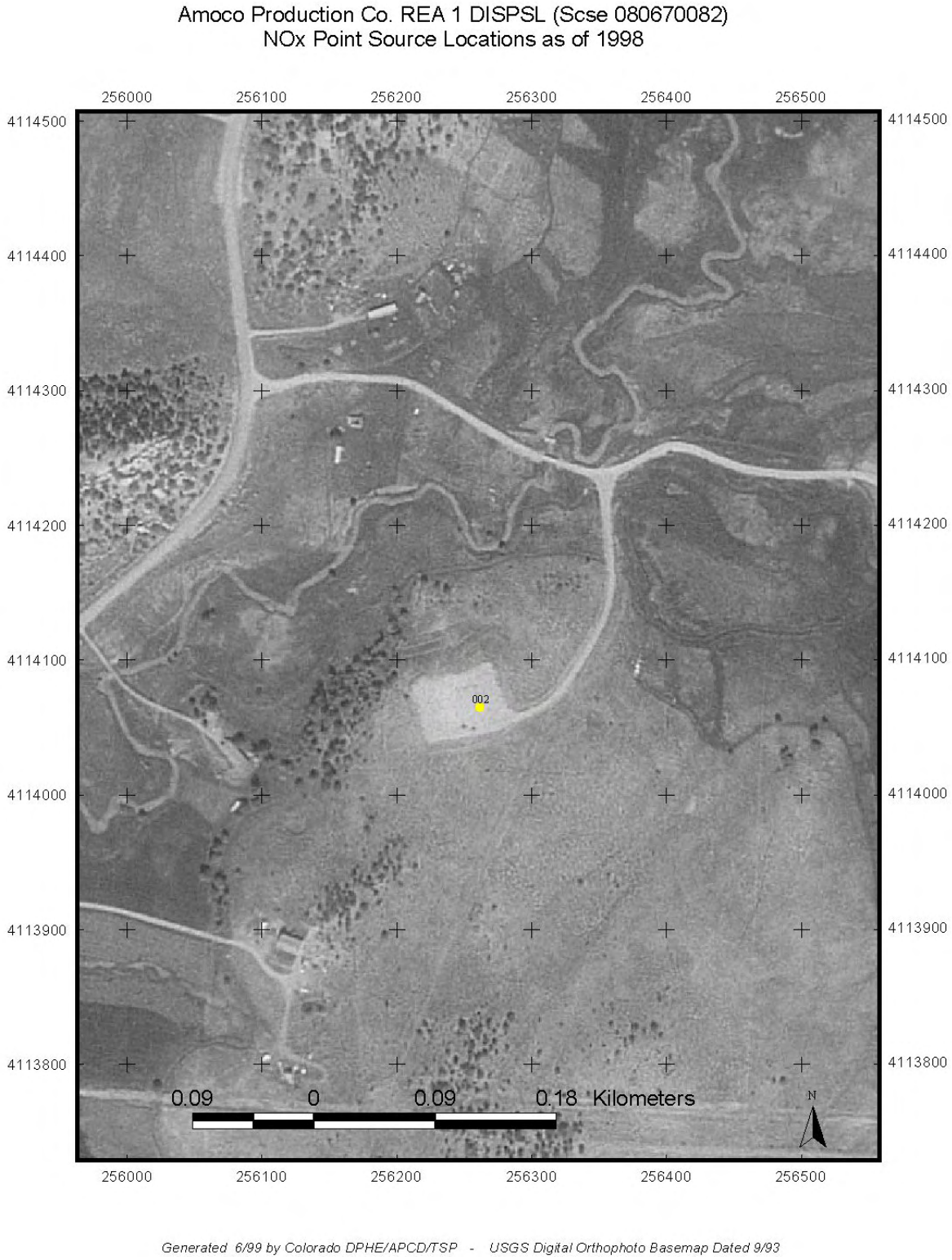


Figure 43. Source location on a USGS DOQ: Amoco REA 1 DSPL – SCSE 080670082.

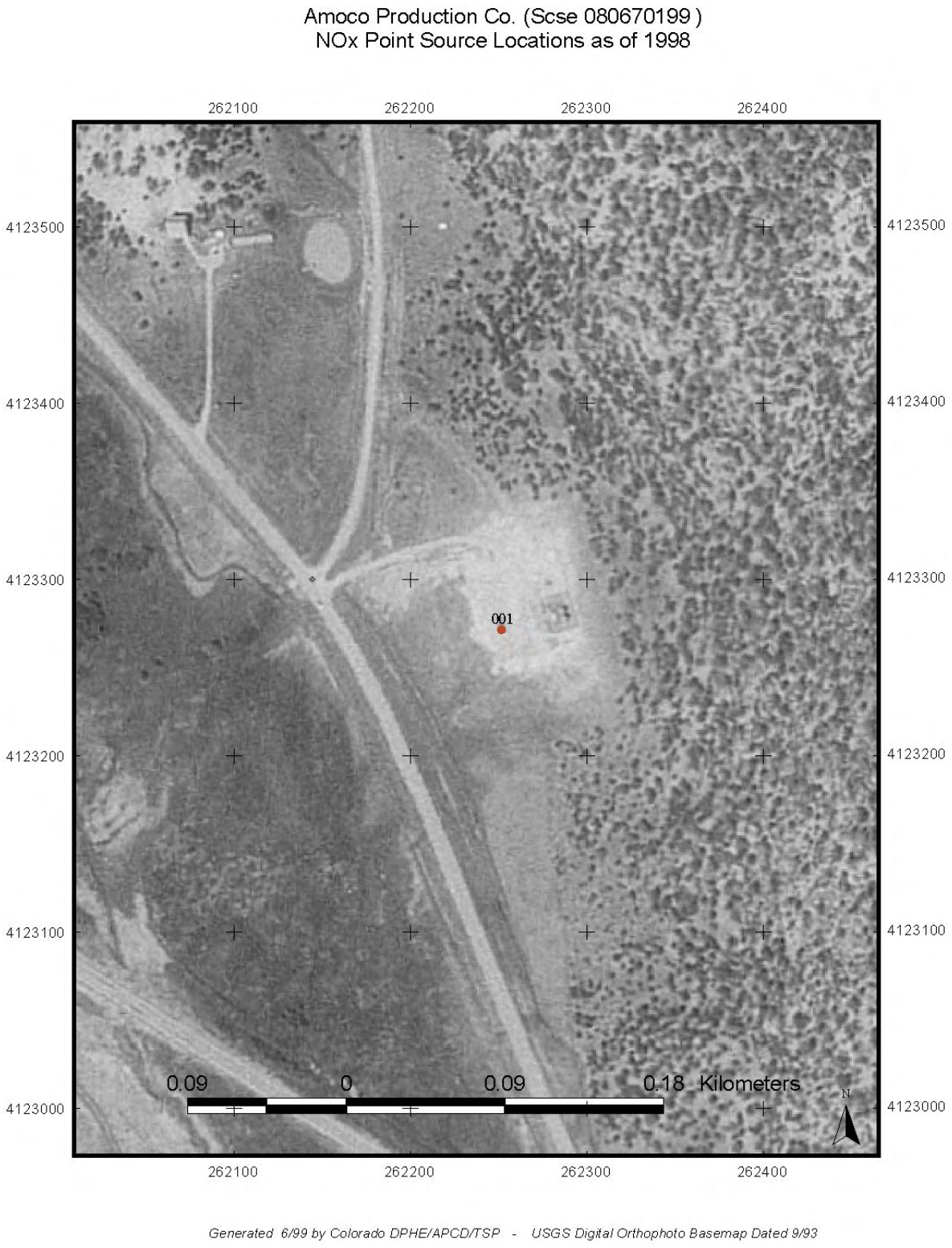


Figure 44. Source location on a USGS DOQ: Amoco – SCSE 080670199.

Figure 45. Source location on a USGS DOQ: SG Interest Ltd - 080670238

Figure 46. Source location on a USGS DOQ: Petrogulf – SCSE 080670243.

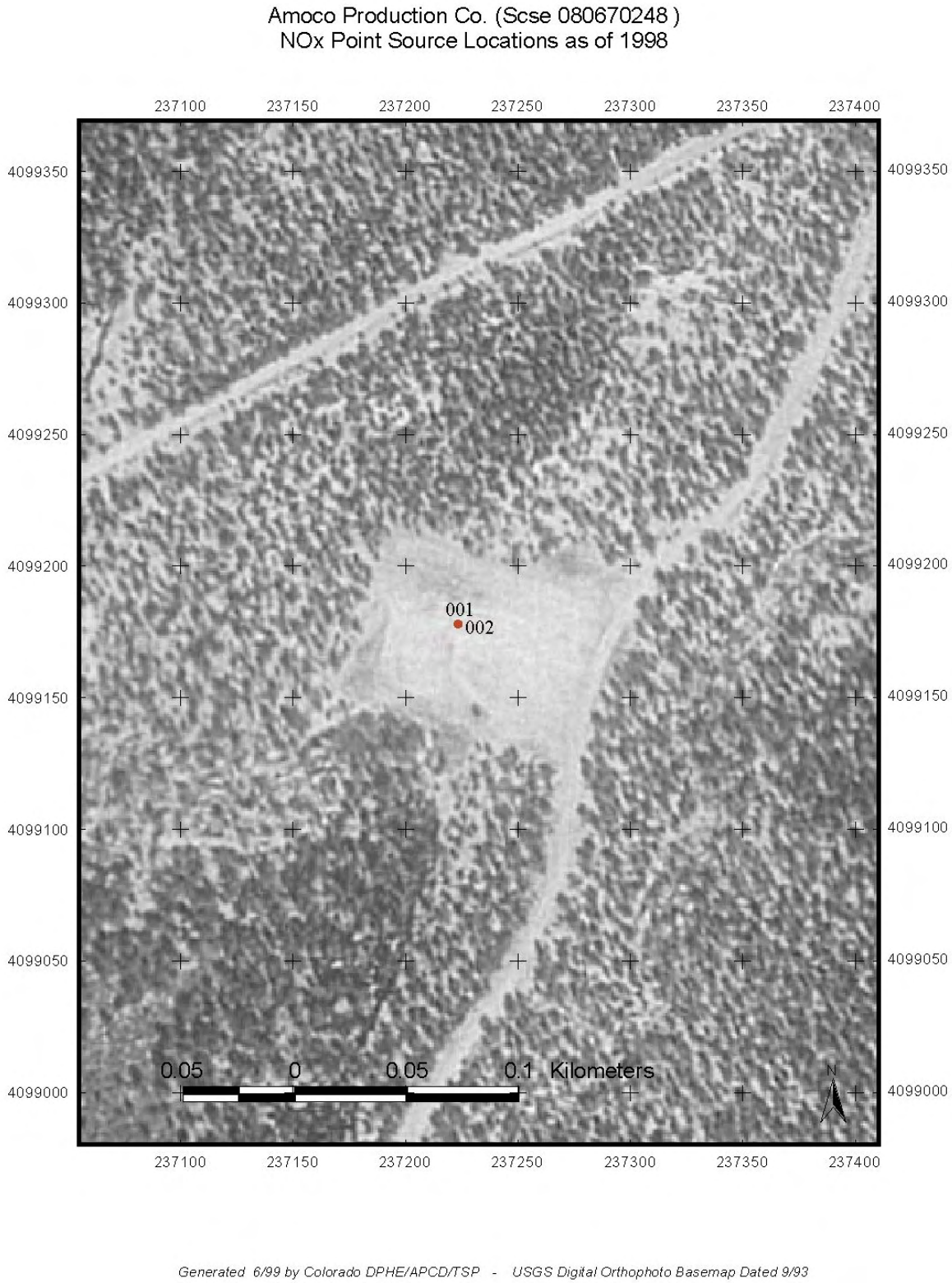


Figure 47. Source location on a USGS DOQ: Amoco – SCSE 080670248.

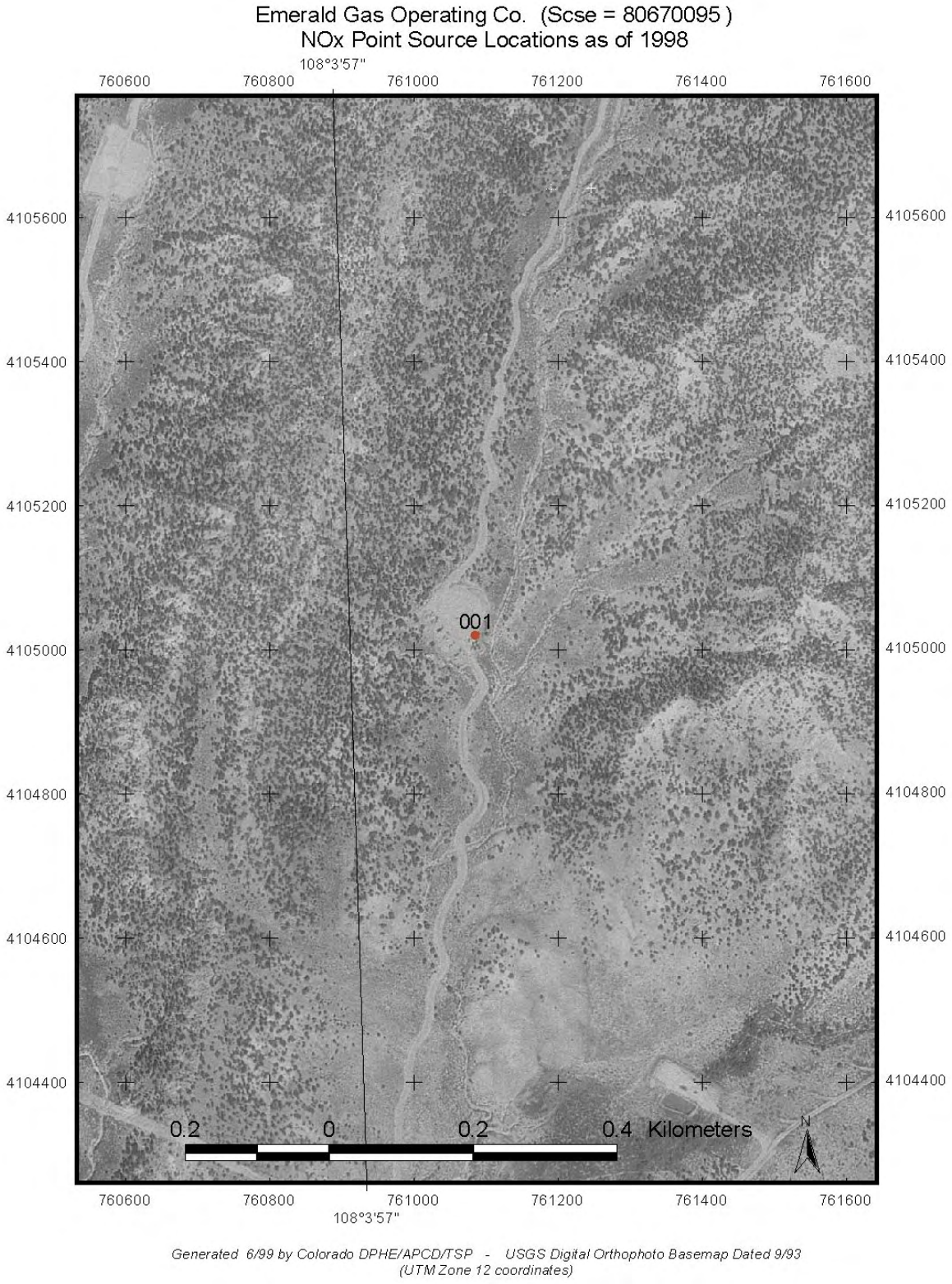


Figure 48. Source location on a USGS DOQ: Emerald Gas – SCSE 080670095.

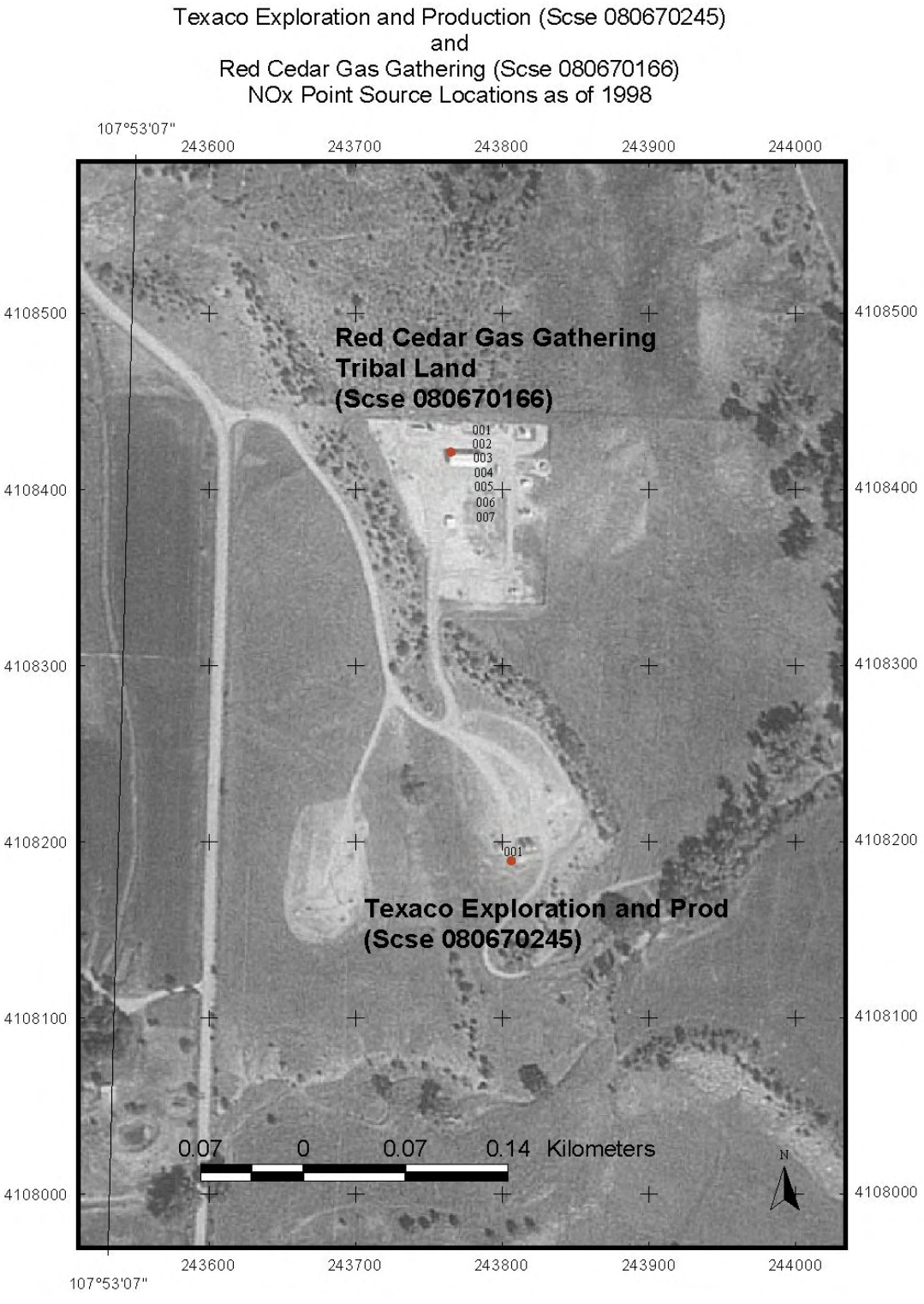


Figure 49. Source location on a USGS DOQ: Texaco – SCSE 080670245.

24. Source-by-Source PSD Increment Analysis - San Juan Generating Station (New Mexico)

This section provides background information on the San Juan Generating Station. The data shown here has been obtained from EPA for 1990 through 1997 and directly from the Public Service Company of New Mexico (PNME) for other years.

Table 30. Changes in NOx emissions at the San Juan Generating Station.

Unit	1990 Emissions[24] (tons per year)	1998 Emissions[25] (tons per year)	Change (tons per year)
1	4131	5730	1599
2	6687	7942.4	1255.4
3	7645	7526.1	-118.9
4	6638	9768.7	3130.7
TOTAL	25101	30967	**5866**

According to PNME, no additional emission controls for NOx have been added to this facility. The facility is a baseline facility with respect to the NO_2 major and minor source baseline dates. Thus, there are no retired baseline emissions due to controls. Annual emissions from the San Juan Generating Station have increased by about 5866 tons between 1990 and 1998 as shown in the table above. The 1998 data has been obtained directly from Public Service Company of New Mexico (PSNM).[26] PSNM did not have readily available emissions data for 1989 but did indicate that the capacity factor for 1989 was 73.77%, which is quite close to the 1994 capacity factor of 73.91% where the emissions estimate from PSNM was 24960 tons per year (as a point of comparision, EPA's acid rain database states that the emission rate for 1994 was 25924 tons per year). Thus, the 1989 emission rate should be close to 25,000 tons per year. Therefore, since PSNM did not have pre-1994 emissions estimates readily available, EPA's 1990 acid rain emission estimates for the facility were used to represent 1989. For 1990, the EPA emissions estimate is 25,101 tons per year. This is quite close to what PSNM believes the 1989 emissions should be based on the comparison of capacity factors between 1989 and 1994. As an aside, it should be noted that PSNM indicated that the level of change in emissions between 1990 and 1997 in EPA's acid rain data is reasonably consistent with the increased capacity factors

[24] http://www.epa.gov/acidrain/emission/nm/2451_f.htm

[25] "Acid Rain Emission Scorecard 1997: SO2, NOx, Heat Input, and CO2 Emission Trends in the Electric Utility Industry," EPA-430-R-98-020, U.S. EPA/Air and Radiation, January 1999.

[26] Phone conversation between Nancy Norem (PSNM) and Chuck Machovec (APCD), July 9, 1999.

experienced by the power plant. Between 1990 and 1997, data from EPA suggests emissions have increased from 25101 tons per year to 30917 tons per year (see tables on graphs on the next two pages for 1990-1996 comparisons from EPA).[27]

Any change in emissions after the minor source baseline date can affect PSD increments, even at sources not subject to PSD permit review. Thus, the overall increase from this facility is considered to be increment consuming. As graphs on the following pages show, the amount of increment consuming (or expanding) emissions changes with respect to time. This helps illustrate the fact that tracking PSD increment consumption/expansion is a moving target.

The increases in emissions since 1990 have been included in the modeling inventory for this study. The one unit with a slight decrease in emissions (-118 tpy) has been excluded from the air quality modeling. It is considered to be increment expanding in this study.

Table 31. Plant Summary by Unit[28] - San Juan Plant New Mexico

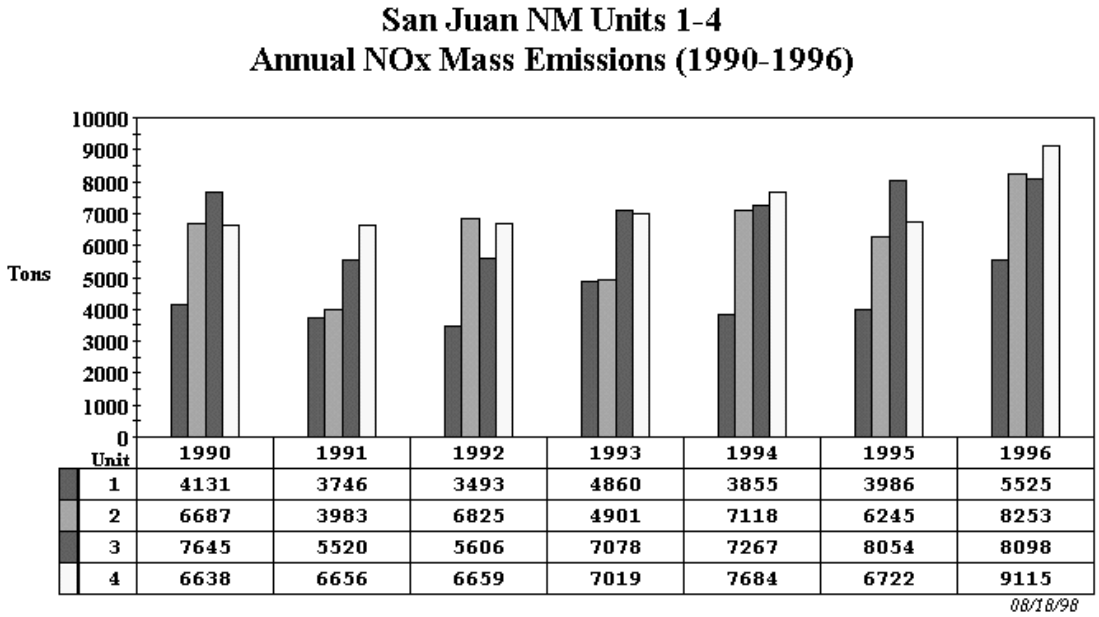
BOILER ID	BOILER TYPE	FUEL TYPE	NAMEPLATE CAPACITY	PEAKING?	CONTROLS		
					SO_2	NO_x	NO_x INSTALL DATE
1	DB	C	361	--	O	LNB	12/1/1976
2	DB	C	350	--	O	OFA	1/1/1979
3	DB	C	534	--	O	LNB	12/1/1979
4	DB	C	534	--	O	LNB	4/1/1982

DB=Dry Bottom Wall-Fired (Front, Rear or Opposed) O=Other LNB=Low NOx Burner Technology OFA=Overfire Air

[27] http://www.epa.gov/acidrain/emission/nm/2451_f.htm

[28] http://www.epa.gov/acidrain/emission/nm/2451_f.htm

Figure 50. San Juan Generating Station in 1987. (reproduced with permission of G. Donald Bain; photo courtesy of The Geo-Images Project, Department of Geography, University of California, Berkeley, http://GeoImages.Berkeley.EDU)



Unit	1990	1991	1992	1993	1994	1995	1996
1	4131	3746	3493	4860	3855	3986	5525
2	6687	3983	6825	4901	7118	6245	8253
3	7645	5520	5606	7078	7267	8054	8098
4	6638	6656	6659	7019	7684	6722	9115

Figure 51. NOx emissions from each unit at the San Juan Generating Station.

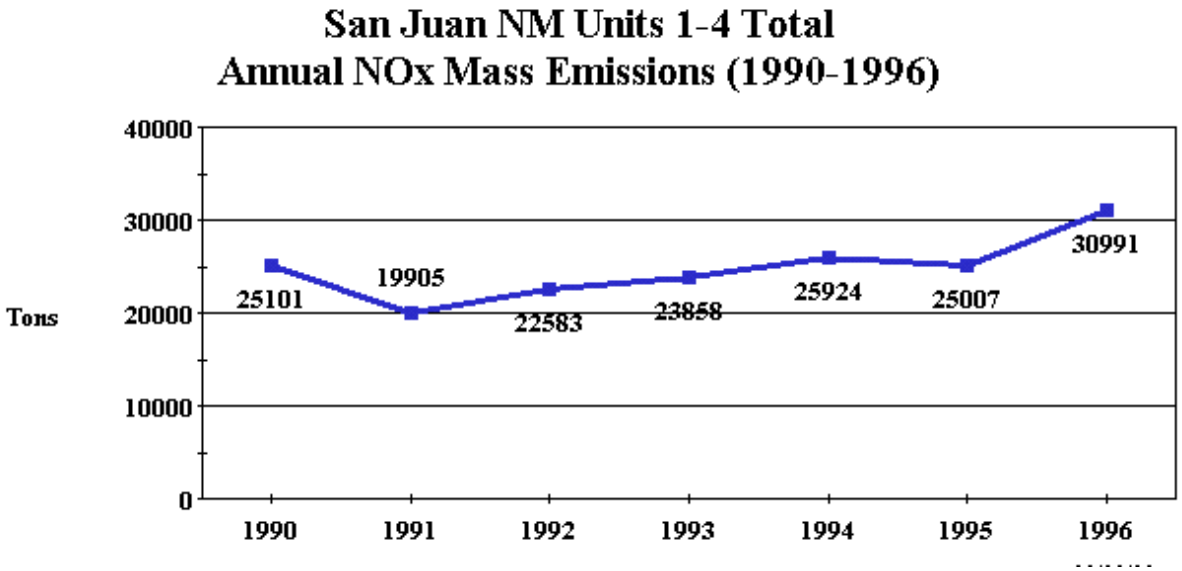


Figure 52. Total annual NOx emissions from 1990 to 1996 at the San Juan Generating Station.

25. Source-by-Source PSD Increment Analysis - Four Corners Power Plant (New Mexico)

This section provides background information on the Four Corners Power Plant. The data shown here has been obtained from EPA for 1990 through 1997. The power plant has five units.

Table 32. Plant Summary by Unit[29] - Four Corners Plant New Mexico

BOILER ID	BOILER TYPE	FUEL TYPE	NAMEPLATE CAPACITY	PEAKING?	CONTROLS		
					SO_2	NO_x	NO_x INSTALL DATE
1	DB	C	190	--	WL	U	--
2	DB	C	190	--	WL	U	11/1998**
3	DB	C	253	--	WL	LNB	7/1/1990
4	DB	C	818	--	WL	LNB	4/1/1989
5	CB	C	818	--	WL	LNB	4/1/1991

DB=Dry Bottom Wall-Fired (Front, Rear or Opposed) CB=Cell Burner Wall-Fired WL=Wet Lime FGD U=Uncontrolled LNB=Low NOx Burner Technology

** Unit 2 install date added to this table by Colorado DPHE based on information received from the environmental manager, Rob Clifford, by telephone in July 1999. Additional controls have not yet been added to unit 1 (as of July 1999).

Table 33. Change in NOx emissions from Four Corners between 1990 and 1997.

Unit	1990 Emissions[30] (tons per year)	1997 Emissions[31] (tons per year)	Change (tons per year)
1	6026	6597	571
2	5845	6069	224
3	7983	4592	-3391
4	13481	15175	1694
5	30177	12649	-17528
TOTAL	63512	45082	**-18430**

[29] http://www.epa.gov/acidrain/emission/nm/2451_f.htm

[30] http://www.epa.gov/acidrain/emission/nm/2451_f.htm

[31] "Acid Rain Emission Scorecard 1997: SO2, NOx, Heat Input, and CO2 Emission Trends in the Electric Utility Industry," EPA-430-R-98-020, U.S. EPA/Air and Radiation, January 1999.

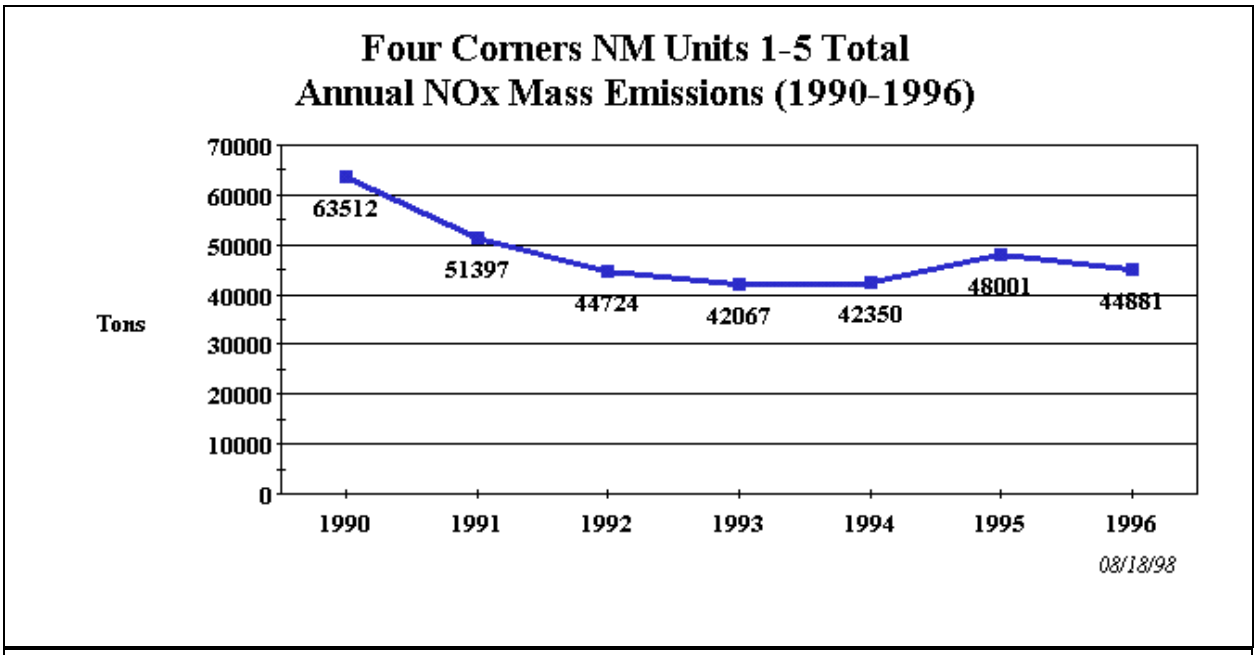
Additional emission controls for NOx have been added to this facility for four out of the five units since 1989. Low NOx burners were installed as follows:

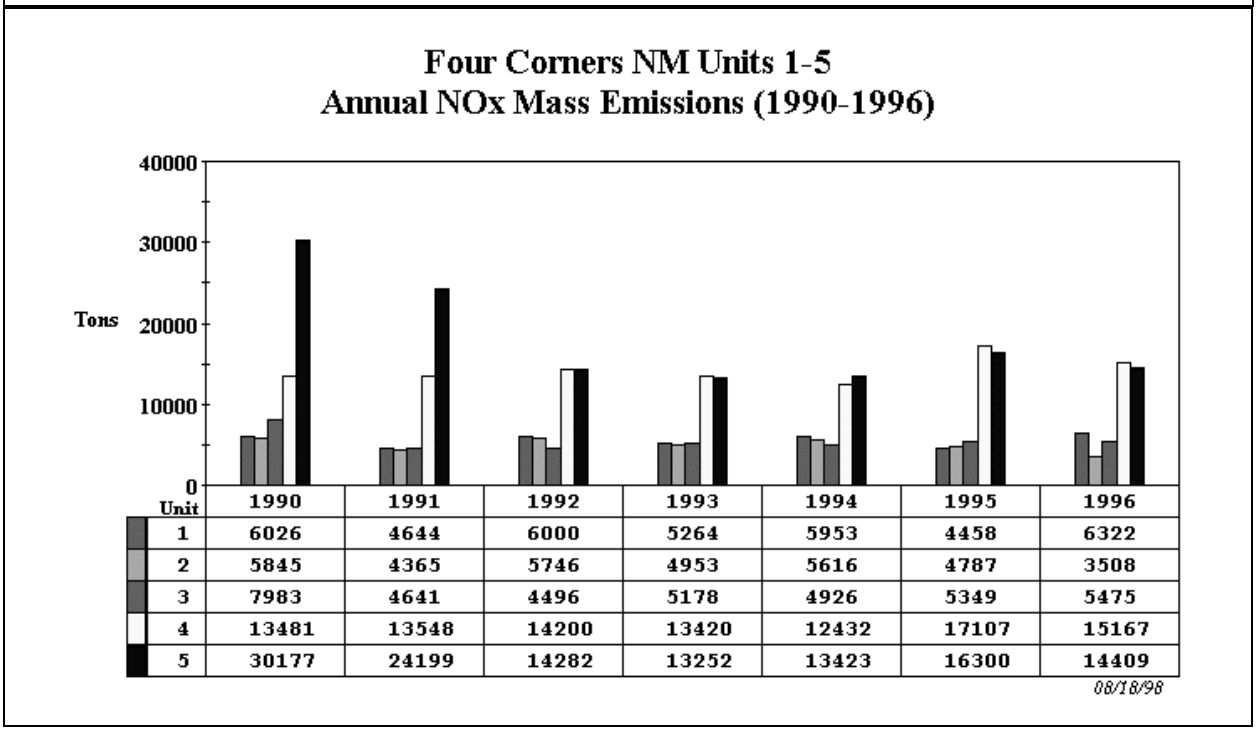
- unit 4 on 4/1/1989 (installed before the NM AQCR 014 NO_2 minor source baseline date of 6/6/1989 but after the Colorado minor source baseline date)
- unit 3 in 7/1/1990 (installed after minor source New Mexico and Colorado minor souirce baseline dates)
- unit 5 in 4/1/1991 (installed before the New Mexico minor source baseline date but after the Colorado minor source baseline date)
- unit 2 in November 1998 (installed after minor source baseline date in New Mexico and Colorado)

For a typical source, addition of controls after the minor source baseline date affects the increment status of emissions from the unit, even for baseline sources. For example, those units which have been controlled after the minor source baseline date would be considered to be "increment consuming" units. The emissions from the units before the new controls would be treated as “retired baseline emissions.”

Thus, the retired units without controls would expand increment while the new units with controls would consume increment. For example, emissions from units 2, 3, 4, and 5 after the addition of low NOx burners would be increment consuming at receptors in Colorado, although unit 4 would not consume increment at receptors in New Mexico. For unit 1, which has not yet had new controls installed, the change in actual emissions between 1989 and the present would be used to determine emission increases or decreases that affect increments.

In this study, the Division has not determined the actual increment status of emissions from the Four Corners Plant. There may be rules, policies, or agreements in place that would affect how increment consumption or expansion would be determined at this particular facility. The Division contacted EPA to determine how to treat the emissions changes at the Four Corners Plant, but never received a clear determination about how to treat the emissions. Thus, in this study, the Division has assumed that changes in emissions at this facility do not consume or expand PSD increment. This assumption should be revisited the next time an increment analysis is done in this area.





Unit	1990	1991	1992	1993	1994	1995	1996
1	6026	4644	6000	5264	5953	4458	6322
2	5845	4365	5746	4953	5616	4787	3508
3	7983	4641	4496	5178	4926	5349	5475
4	13481	13548	14200	13420	12432	17107	15167
5	30177	24199	14282	13252	13423	16300	14409

Figure 53. Annual NOx emissions at the Four Corners Power Plant.

26. Stationary Sources in the Emission Inventory Not Discussed in Earlier Sections

This section provides a summary of emissions from smaller sources from AIRS in the Colorado portion of the study area that have not undergone quality assurance checks by the Division. It also includes facilities from AIRS emitting less than 20 tons per year. The geographic coordinates are from AIRS and have not been quality checked as part of this study.

This section may also include some large sources from AIRS that have been added to the database between early 1999 (the vintage of the main inventory used in this study) and June 1999, the date of the final AIRS retrieval used to populate the rest of the inventory.

The following table also includes the inventory of sources obtained from preliminary inventory files developed as part of the draft Southern Ute Indian Tribe EIS. Since it appears that many of these sources are not in AIRS and/or were not permitted by the Division (or were not part of the AIRS retrievals obtained for this study), little is known about these sources. Conservative assumptions with respect to increment consumption have been made when no information is available. That is, if no information is available to determine the increment status, it has been assumed that the source is increment consuming. In some cases where the Division did not issue permits for a source in Colorado, information from permits issued by EPA was used to verify increment status.

The assumed increment status of each unit is presented in the following table. Geographical Information Systems (GIS) analysis has been used to compare the sources in the following table and all other sources listed in previous sections so as to reduce the possibility of double counting a source.

Finally, the inventories presented in this report do not include the New Mexico increment consuming inventory that was used in the modeling. The increment inventory from New Mexico used in this study is available in ISCST3 format upon request.

Table 34. Smaller sources from AIRS in the Colorado portion of the study area that have not undergone quality assurance checks by the Division.

Startup after 3/1989	SCSE	PNME	DSC3	EPDS	DSC4	SD07	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
no	081050001	US FOREST INDUSTRIES INC	WOOD WASTE WIGWAM BURNER	88RG148-1.CANC 5/95	WOOD WASTE WIGWAM BURNER		357053.06	4170325.23	050001a	0	27.43	866.33	6.10	6.10
yes (not known; conservatively assumed to increment consuming)	80670061	AMOCO PRODUCTION CO DURANGO AREA	(104) POCOMPS @ 1				250500.00	4118500.00	CO314	0.313004	2.44	922.04	7.76	0.15
yes (not known; conservatively assumed to increment consuming)	80670061	AMOCO PRODUCTION CO DURANGO AREA	(104) POCOMPS @ 1				252500.00	4118500.00	CO315	0.313004	2.44	922.04	7.76	0.15
yes (not known; conservatively assumed to increment consuming)	80670061	AMOCO PRODUCTION CO DURANGO AREA	(104) POCOMPS @ 1				254500.00	4118500.00	CO316	0.313004	2.44	922.04	7.76	0.15
yes (not known; conservatively assumed to increment consuming)	80670061	AMOCO PRODUCTION CO DURANGO AREA	(104) POCOMPS @ 1				256500.00	4118500.00	CO317	0.313004	2.44	922.04	7.76	0.15
yes (not known; conservatively assumed to increment consuming)	80670061	AMOCO PRODUCTION CO DURANGO AREA	(104) POCOMPS @ 1				258500.00	4118500.00	CO318	0.313004	2.44	922.04	7.76	0.15
yes (not known; conservatively assumed to increment consuming)	80670061	AMOCO PRODUCTION CO DURANGO AREA	(104) POCOMPS @ 1				260500.00	4118500.00	CO319	0.313004	2.44	922.04	7.76	0.15
yes (not known; conservatively assumed to increment consuming)	80670061	AMOCO PRODUCTION CO DURANGO AREA	(104) POCOMPS @ 1				262500.00	4118500.00	CO320	0.313004	2.44	922.04	7.76	0.15
yes (not known; conservatively assumed to increment consuming)	80670061	AMOCO PRODUCTION CO DURANGO AREA	(104) POCOMPS @ 1				264500.00	4118500.00	CO321	0.313004	2.44	922.04	7.76	0.15
yes (not known; conservatively assumed to increment consuming)	80670061	AMOCO PRODUCTION CO DURANGO AREA	(104) POCOMPS @ 1				266500.00	4118500.00	CO322	0.313004	2.44	922.04	7.76	0.15
yes (not known; conservatively assumed to increment consuming)	80670061	AMOCO PRODUCTION CO DURANGO AREA	(104) POCOMPS @ 1				268500.00	4118500.00	CO323	0.313004	2.44	922.04	7.76	0.15
yes (not known; conservatively assumed to increment consuming)	80670061	AMOCO PRODUCTION CO DURANGO AREA	(104) POCOMPS @ 1				270500.00	4118500.00	CO324	0.313004	2.44	922.04	7.76	0.15
yes (not known; conservatively assumed to increment consuming)	80670061	AMOCO PRODUCTION CO DURANGO AREA	(104) POCOMPS @ 1				250500.00	4119500.00	CO325	0.313004	2.44	922.04	7.76	0.15
yes (not known; conservatively assumed to increment consuming)	80670061	AMOCO PRODUCTION CO DURANGO AREA	(104) POCOMPS @ 1				252500.00	4119500.00	CO326	0.313004	2.44	922.04	7.76	0.15
yes (not known; conservatively assumed to increment consuming)	80670061	AMOCO PRODUCTION CO DURANGO AREA	(104) POCOMPS @ 1				254500.00	4119500.00	CO327	0.313004	2.44	922.04	7.76	0.15
yes (not known; conservatively assumed to increment consuming)	80670061	AMOCO PRODUCTION CO DURANGO AREA	(104) POCOMPS @ 1				256500.00	4119500.00	CO328	0.313004	2.44	922.04	7.76	0.15
yes (not known; conservatively assumed to increment consuming)	80670061	AMOCO PRODUCTION CO DURANGO AREA	(104) POCOMPS @ 1				258500.00	4119500.00	CO329	0.313004	2.44	922.04	7.76	0.15
yes (not known;	80670061	AMOCO	(104) POCOMPS @ 1				260500.00	4119500.00	CO330	0.313004	2.44	922.04	7.76	0.15

Startup after 3/1989	SCSE	PNME	DSC3	EPDS	DSC4	SD07	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
conservatively assumed to increment consuming)		PRODUCTION CO DURANGO AREA												
yes (not known; conservatively assumed to increment consuming)	80670061	AMOCO PRODUCTION CO DURANGO AREA	(104) POCOMPS @ 1				262500.00	4119500.00	CO331	0.313004	2.44	922.04	7.76	0.15
yes (not known; conservatively assumed to increment consuming)	80670061	AMOCO PRODUCTION CO DURANGO AREA	(104) POCOMPS @ 1				264500.00	4119500.00	CO332	0.313004	2.44	922.04	7.76	0.15
yes (not known; conservatively assumed to increment consuming)	80670061	AMOCO PRODUCTION CO DURANGO AREA	(104) POCOMPS @ 1				266500.00	4119500.00	CO333	0.313004	2.44	922.04	7.76	0.15
yes (not known; conservatively assumed to increment consuming)	80670061	AMOCO PRODUCTION CO DURANGO AREA	(104) POCOMPS @ 1				268500.00	4119500.00	CO334	0.313004	2.44	922.04	7.76	0.15
yes (not known; conservatively assumed to increment consuming)	80670061	AMOCO PRODUCTION CO DURANGO AREA	(104) POCOMPS @ 1				270500.00	4119500.00	CO335	0.313004	2.44	922.04	7.76	0.15
yes (not known; conservatively assumed to increment consuming)	80670061	AMOCO PRODUCTION CO DURANGO AREA	(104) POCOMPS @ 1				250500.00	4120500.00	CO336	0.313004	2.44	922.04	7.76	0.15
yes (not known; conservatively assumed to increment consuming)	80670061	AMOCO PRODUCTION CO DURANGO AREA	(104) POCOMPS @ 1				252500.00	4120500.00	CO337	0.313004	2.44	922.04	7.76	0.15
yes (not known; conservatively assumed to increment consuming)	80670061	AMOCO PRODUCTION CO DURANGO AREA	(104) POCOMPS @ 1				254500.00	4120500.00	CO338	0.313004	2.44	922.04	7.76	0.15
yes (not known; conservatively assumed to increment consuming)	80670061	AMOCO PRODUCTION CO DURANGO AREA	(104) POCOMPS @ 1				256500.00	4120500.00	CO339	0.313004	2.44	922.04	7.76	0.15
yes (not known; conservatively assumed to increment consuming)	80670061	AMOCO PRODUCTION CO DURANGO AREA	(104) POCOMPS @ 1				258500.00	4120500.00	CO340	0.313004	2.44	922.04	7.76	0.15
yes (not known; conservatively assumed to increment consuming)	80670061	AMOCO PRODUCTION CO DURANGO AREA	(104) POCOMPS @ 1				260500.00	4120500.00	CO341	0.313004	2.44	922.04	7.76	0.15
yes (not known; conservatively assumed to increment consuming)	80670061	AMOCO PRODUCTION CO DURANGO AREA	(104) POCOMPS @ 1				262500.00	4120500.00	CO342	0.313004	2.44	922.04	7.76	0.15
yes (not known; conservatively assumed to increment consuming)	80670061	AMOCO PRODUCTION CO DURANGO AREA	(104) POCOMPS @ 1				264500.00	4120500.00	CO343	0.313004	2.44	922.04	7.76	0.15
yes (not known; conservatively assumed to increment consuming)	80670061	AMOCO PRODUCTION CO DURANGO AREA	(104) POCOMPS @ 1				266500.00	4120500.00	CO344	0.313004	2.44	922.04	7.76	0.15
yes (not known; conservatively assumed to increment consuming)	80670061	AMOCO PRODUCTION CO DURANGO AREA	(104) POCOMPS @ 1				268500.00	4120500.00	CO345	0.313004	2.44	922.04	7.76	0.15
yes (not known; conservatively assumed to increment consuming)	80670061	AMOCO PRODUCTION CO DURANGO AREA	(104) POCOMPS @ 1				270500.00	4120500.00	CO346	0.313004	2.44	922.04	7.76	0.15
yes (not known; conservatively assumed to increment consuming)	none	Amoco - CHIPAROSA					239913.00	4105736.00	TR101	0.678883	5.79	655.37	37.74	3.05
yes (not known; conservatively assumed to increment consuming)	none	Amoco - CHIPAROSA					239903.00	4105736.00	TR102	0.678883	5.79	655.37	37.74	3.05
yes (not known;	none	Amoco - CHIPAROSA					239923.00	4105736.00	TR103	0.020136	7.32	533.15	0.49	3.66

Startup after 3/1989	SCSE	PNME	DSC3	EPDS	DSC4	SD07	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
conservatively assumed to increment consuming)														
yes (not known; conservatively assumed to increment consuming)	none	Amoco - Montgomery					243820.00	4111742.00	TR104	0.678883	5.79	655.37	37.74	3.05
yes (not known; conservatively assumed to increment consuming)	none	Amoco - SALVADOR II					267210.00	4106600.00	TR105	0.678883	5.79	655.37	37.74	3.05
yes (not known; conservatively assumed to increment consuming)	none	Amoco - SALVADOR II					267200.00	4106600.00	TR106	0.368208	5.61	994.26	5.32	3.05
yes (not known; conservatively assumed to increment consuming)	none	Apache * - Bondad 34-10	comp 1				243945.00	4114924.00	TR107	0.077669	3.05	949.82	1.02	0.91
yes (not known; conservatively assumed to increment consuming)	none	Apache * - Bondad 34-10	comp 7				243945.00	4114924.00	TR108	0.077669	3.05	949.82	1.02	0.91
yes (not known; conservatively assumed to increment consuming)	none	Apache * - Bondad 34-10	comp 3x				243990.00	4118115.00	TR109	0.342318	3.66	810.93	23.20	1.22
yes (not known; conservatively assumed to increment consuming)	none	Apache * - Colo 32-8	comp 1-6				254698.00	4103351.00	TR110	0.077669	3.05	949.82	1.02	0.91
yes (not known; conservatively assumed to increment consuming)	none	Apache * - Colo 32-8	comp 2-4				257993.00	4103276.00	TR111	0.077669	3.05	949.82	1.02	0.91
yes (not known; conservatively assumed to increment consuming)	none	Apache * - Trail Canyon	comp 44-30				254767.00	4106532.00	TR112	0.376837	3.05	413.71	36.58	1.22
yes (not known; conservatively assumed to increment consuming)	none	Apache * - Ute	comp 3				265786.00	4098220.00	TR113	0.189857	3.05	810.93	23.20	1.22
yes (not known; conservatively assumed to increment consuming)	none	Apache * - Ute	comp3-a				265786.00	4098220.00	TR114	0.077669	3.05	949.82	1.02	0.91
yes (not known; conservatively assumed to increment consuming)	none	Burlington - ANTLER COMP	comp eng				230641.00	4100957.00	TR115	0.667376	6.40	616.48	66.14	4.27
yes (not known; conservatively assumed to increment consuming)	none	Burlington - ANTLER COMP	comp eng				230879.00	4101019.00	TR116	0.667376	6.40	616.48	66.14	4.27
yes (not known; conservatively assumed to increment consuming)	none	Burlington - ANTLER COMP	comp eng				230892.00	4101018.00	TR117	0.667376	6.40	616.48	66.14	4.27
yes (not known; conservatively assumed to increment consuming)	none	Burlington - ANTLER COMP	comp eng				230906.00	4101017.00	TR118	0.667376	6.40	616.48	66.14	4.27
yes (not known; conservatively assumed to increment consuming)	none	Burlington - ANTLER COMP	amine pump eng				230837.00	4101023.00	TR119	0.742168	4.88	755.37	38.40	3.05
yes (not known; conservatively assumed to increment consuming)	none	Burlington - ANTLER COMP	amine pump eng				230838.00	4101026.00	TR120	0.742168	4.88	755.37	38.40	3.05
yes (not known; conservatively assumed to increment consuming)	none	Burlington - ANTLER COMP	gen eng				230838.00	4101031.00	TR121	0.742168	4.88	755.37	38.40	3.05
yes (not known;	none	Burlington - ANTLER	gen eng				230838.00	4101035.00	TR122	0.742168	4.88	755.37	38.40	3.05

Startup after 3/1989	SCSE	PNME	DSC3	EPDS	DSC4	SD07	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
conservatively assumed to increment consuming)		COMP												
yes (not known; conservatively assumed to increment consuming)	none	Burlington - ANTLER COMP	amine reboiler				230776.00	4100999.00	TR123	0.891753	22.56	672.04	3.66	10.97
yes (not known; conservatively assumed to increment consuming)	none	Burlington - ANTLER COMP	process gly heater				230770.00	4101001.00	TR124	0.020136	9.14	533.15	0.61	5.49
yes (not known; conservatively assumed to increment consuming)	none	Burlington - ANTLER COMP	fuel gas gly heater				230902.00	4100983.00	TR125	0.000863	4.27	533.15	0.15	2.44
yes (not known; conservatively assumed to increment consuming)	none	Burlington - UTE COMP STA	comp eng				231345.00	4100932.00	TR126	0.371084	4.88	755.37	38.50	3.05
yes (not known; conservatively assumed to increment consuming)	none	Burlington - UTE COMP STA	comp eng				231345.00	4100936.00	TR127	0.371084	4.88	755.37	38.50	3.05
yes (not known; conservatively assumed to increment consuming)	none	Burlington - UTE COMP STA	comp eng				231346.00	4100941.00	TR128	0.371084	4.88	755.37	38.50	3.05
yes (not known; conservatively assumed to increment consuming)	none	Burlington - UTE COMP STA	gen eng				231347.00	4100965.00	TR129	0.166844	2.44	810.93	23.20	1.83
yes (not known; conservatively assumed to increment consuming)	none	Burlington - UTE COMP STA	gen eng				231348.00	4100977.00	TR130	0.166844	2.44	810.93	23.20	1.83
yes (not known; conservatively assumed to increment consuming)	none	Burlington - UTE COMP STA	glycol heater				231375.00	4100958.00	TR131	0.00863	7.32	533.15	0.49	3.66
yes (not known; conservatively assumed to increment consuming)	none	Burlington - UTE COMP STA	glycol heater				231373.00	4100958.00	TR132	0.00863	7.32	533.15	0.49	3.66
yes (not known; conservatively assumed to increment consuming)	none	El Paso N G - COYOTE GULCH	Comp engine				226748.00	4100915.00	TR133	0.864137	9.14	672.04	53.34	4.86
yes (not known; conservatively assumed to increment consuming)	none	El Paso N G - COYOTE GULCH	Comp engine				226750.00	4100920.00	TR134	0.864137	9.14	672.04	53.34	4.86
yes (not known; conservatively assumed to increment consuming)	none	El Paso N G - COYOTE GULCH	Comp engine				226664.00	4100940.00	TR135	0.648391	9.14	672.04	40.54	4.86
yes (not known; conservatively assumed to increment consuming)	none	El Paso N G - COYOTE GULCH	reboiler				226670.00	4100957.00	TR136	0.337428	24.38	516.48	30.48	10.35
yes (not known; conservatively assumed to increment consuming)	none	El Paso N G - COYOTE GULCH	reboiler				226677.00	4100971.00	TR137	0.337428	24.38	516.48	30.48	10.35
yes (not known; conservatively assumed to increment consuming)	none	El Paso N G - COYOTE GULCH	dehydrator				226750.00	4100927.00	TR138	0.017547	15.24	477.59	24.38	3.04
yes (not known; conservatively assumed to increment consuming)	none	Enervest - Black Ridge #8-2	comp				236980.00	4112216.00	TR139	0.28306	7.70	541.48	13.97	5.26
yes (not known; conservatively assumed to increment consuming)	none	Enervest - Bridge Timber#36-1	comp				234585.00	4114834.00	TR140	0.244225	2.21	949.82	1.63	0.91
yes (not known;	none	Enervest - INDIAN	comp				234388.00	4118420.00	TR141	0.28306	7.70	541.48	13.97	5.26

Startup after 3/1989	SCSE	PNME	DSC3	EPDS	DSC4	SD07	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
conservatively assumed to increment consuming)		CREEK 2-24												
yes (not known; conservatively assumed to increment consuming)	none	Enervest - INDIAN CREEK 2-24	comp				234388.00	4118420.00	TR142	0.28306	7.70	541.48	13.97	5.26
yes (not known; conservatively assumed to increment consuming)	none	Enervest - INDIAN CREEK 2-24	comp				234388.00	4118420.00	TR143	0.170008	6.60	522.04	14.16	4.04
yes (not known; conservatively assumed to increment consuming)	none	Enervest - Val Cnyn # 20-6	comp				227567.00	4109026.00	TR144	0.170008	6.60	522.04	15.17	4.04
yes (not known; conservatively assumed to increment consuming)	none	Enervest - Val Cnyn # 29-3	comp				227284.00	4107048.00	TR145	0.431493	5.61	949.82	15.48	2.44
yes (not known; conservatively assumed to increment consuming)	none	Enervest - Val Cnyn # 31-1	comp				226269.00	4105713.00	TR146	0.431493	5.61	949.82	15.48	2.44
yes (not known; conservatively assumed to increment consuming)	none	Enervest - VAL CNYN # 32-4	comp				227839.00	4106194.00	TR147	0.478958	5.94	695.37	37.74	4.27
yes (not known; conservatively assumed to increment consuming)	none	Enervest - VAL CNYN # 32-4	comp				227839.00	4106194.00	TR148	0.28306	7.70	541.48	13.97	5.26
yes (not known; conservatively assumed to increment consuming)	none	Enervest - VAL CNYN # 32-4	comp				227839.00	4106194.00	TR149	0.28306	7.70	541.48	13.97	5.26
yes (not known; conservatively assumed to increment consuming)	none	Enervest - VAL CNYN # 32-4	comp				227839.00	4106194.00	TR150	0.28306	7.70	541.48	13.97	5.26
yes (not known; conservatively assumed to increment consuming)	none	Enervest - VALENCIA CNYN #20-4	comp				228266.00	4109320.00	TR151	0.478958	5.94	695.37	37.74	4.27
yes (not known; conservatively assumed to increment consuming)	none	Enervest - VALENCIA CNYN #20-4	comp				228266.00	4109320.00	TR152	0.377413	5.61	994.26	5.32	3.05
yes (not known; conservatively assumed to increment consuming)	none	Enervest - VALENCIA CNYN #32-1	comp				227476.00	4105827.00	TR153	0.594022	5.94	748.71	38.19	3.66
yes (not known; conservatively assumed to increment consuming)	none	Enervest - VALENCIA CNYN #32-1	comp				227476.00	4105827.00	TR154	0.28306	7.70	541.48	13.97	5.26
yes (not known; conservatively assumed to increment consuming)	none	Enervest - VALENCIA CNYN #32-1	comp				227476.00	4105827.00	TR155	0.28306	7.70	541.48	13.97	5.26
yes (not known; conservatively assumed to increment consuming)	none	Enervest - VALENCIA CNYN #32-1	comp				227476.00	4105827.00	TR156	0.170008	6.60	522.04	14.16	4.04
yes (not known; conservatively assumed to increment consuming)	none	Enervest - VALENCIA CNYN #32-1	comp				227476.00	4105827.00	TR157	0.170008	6.60	522.04	15.17	4.04
yes (not known; conservatively assumed to increment consuming)	none	Hallwood - 44 Canyon CDP	comp				230385.00	4108601.00	TR158	0.170008	6.40	513.71	14.57	4.04
yes (not known; conservatively assumed to increment consuming)	none	Markwest - Alamo CDP*					251000.00	4105000.00	TR162	0.153324	4.82	499.82	11.37	3.66
yes (not known;	none	Red Cedar - ARK.	comp 1				252743.00	4103612.00	TR163	1.104047	5.46	684.82	46.63	5.49

Startup after 3/1989	SCSE	PNME	DSC3	EPDS	DSC4	SD07	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
conservatively assumed to increment consuming)		LOOP*												
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - ARK. LOOP*	comp 2				252743.00	4103618.00	TR164	1.104047	5.24	659.82	46.63	6.10
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - ARK. LOOP*	comp 3				252743.00	4103624.00	TR165	1.104047	5.49	672.04	46.63	6.10
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - ARK. LOOP*	comp 4				252743.00	4103636.00	TR166	1.104047	2.90	664.82	46.63	6.10
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - ARK. LOOP*	comp 5				252743.00	4103654.00	TR167	0.56238	5.81	646.48	37.74	4.88
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - ARK. LOOP*	comp 6				252743.00	4103663.00	TR168	0.56238	5.81	656.48	37.74	4.88
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - ARK. LOOP*	gen 1				252810.00	4103557.00	TR169	0.529874	5.91	652.59	37.74	5.49
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - ARK. LOOP*	gen 2				252804.00	4103557.00	TR170	0.529874	6.11	774.82	37.74	3.66
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - ARK. LOOP*	gen 3				252822.00	4103557.00	TR171	0.529874	5.94	780.37	37.74	5.49
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - ARK. LOOP*	heater 1				252883.00	4103651.00	TR172	0.652705	29.20	533.15	66.14	14.63
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - ARK. LOOP*	heater 2				252883.00	4103636.00	TR173	0.552024	31.24	533.15	66.14	17.37
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - ARK. LOOP*	misc				252810.00	4103636.00	TR174	0.047177	7.67	655.37	37.74	4.88
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - BLACKRIDGE Comp Stat	comp				236733.00	4108241.00	TR175	0.544544	7.67	655.37	37.74	4.88
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - BLACKRIDGE Comp Stat	comp				236733.00	4108241.00	TR176	0.544544	7.67	655.37	37.74	4.88
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - BLACKRIDGE Comp Stat	misc				236733.00	4108241.00	TR177	0.020712	7.67	655.37	37.74	4.88
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - BONDAD COMP	comp				243974.00	4108081.00	TR178	0.559503	7.67	655.37	37.74	4.88
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - BONDAD COMP	comp				243974.00	4108081.00	TR179	0.559503	7.67	655.37	37.74	4.88
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - BONDAD COMP	comp				243974.00	4108081.00	TR180	0.149297	0.97	499.82	13.32	3.66
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - BONDAD COMP	comp				243974.00	4108081.00	TR181	0.077381	1.22	413.71	36.58	1.83
yes (not known;	none	Red Cedar - BONDAD	misc				243974.00	4108081.00	TR182	0.045451	7.67	655.37	37.74	4.88

Startup after 3/1989	SCSE	PNME	DSC3	EPDS	DSC4	SD07	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
conservatively assumed to increment consuming)		COMP												
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - CABIN COMP.	comp				240032.00	4103443.00	TR183	0.667089	7.67	547.04	66.14	4.88
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - CABIN COMP.	comp				240032.00	4103443.00	TR184	0.667089	7.67	547.04	66.14	4.88
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - CABIN COMP.	misc				240032.00	4103443.00	TR185	0.024164	7.67	655.37	37.74	4.88
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - CAPOTE Membrane Plant	comp				249560.00	4105385.00	TR186	0.552024	7.67	655.37	37.74	4.88
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - CAPOTE Membrane Plant	comp				249560.00	4105385.00	TR187	0.552024	7.67	655.37	37.74	4.88
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - CAPOTE Membrane Plant	comp				249560.00	4105385.00	TR188	0.552024	7.67	655.37	37.74	4.88
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - CAPOTE Membrane Plant	comp				249560.00	4105385.00	TR189	0.552024	7.67	655.37	37.74	4.88
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - CAPOTE Membrane Plant	comp				249560.00	4105385.00	TR190	0.552024	7.67	655.37	37.74	4.88
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - CAPOTE Membrane Plant	comp				249560.00	4105385.00	TR191	0.552024	7.67	655.37	37.74	4.88
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - CAPOTE Membrane Plant	misc				249560.00	4105385.00	TR192	0.020999	7.67	655.37	37.74	4.88
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - COX CANYON	comp				240625.00	4100188.00	TR193	0.555763	5.18	572.04	37.80	3.66
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - COX CANYON	comp				240625.00	4100188.00	TR194	5.457527	5.79	655.37	37.74	3.05
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - COX CANYON	misc				240625.00	4100188.00	TR195	0.012082	7.67	655.37	37.74	4.88
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - COYOTE GULCH Comp Station	comp				226939.00	4100723.00	TR196	0.560078	7.67	655.37	37.74	4.88
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - COYOTE GULCH Comp Station	comp				226939.00	4100723.00	TR197	0.559503	7.67	655.37	37.74	4.88
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - COYOTE GULCH Comp Station	comp				226939.00	4100723.00	TR198	0.559503	7.67	655.37	37.74	4.88
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - COYOTE GULCH Comp Station	comp				226939.00	4100723.00	TR199	0.559503	7.67	655.37	37.74	4.88
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - COYOTE GULCH Comp Station	comp				226939.00	4100723.00	TR200	0.559503	7.67	655.37	37.74	4.88
yes (not known;	none	Red Cedar - COYOTE	comp				226939.00	4100723.00	TR201	0.559503	7.67	655.37	37.74	4.88

Startup after 3/1989	SCSE	PNME	DSC3	EPDS	DSC4	SD07	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
conservatively assumed to increment consuming)		GULCH Comp Station												
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - COYOTE GULCH Comp Station	misc				226939.00	4100723.00	TR202	0.032218	7.67	655.37	37.74	4.88
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - SIDEWINDER comp. stat	comp				246996.00	4102232.00	TR203	0.554613	5.18	655.37	37.74	3.66
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - SIDEWINDER comp. stat	comp				246996.00	4102232.00	TR204	5.457527	5.79	655.37	37.74	3.05
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - SIDEWINDER comp. stat	comp				246996.00	4102232.00	TR205	0.077381	1.83	672.04	33.53	0.91
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - SIDEWINDER comp. stat	comp				246996.00	4102232.00	TR206	0.012082	7.67	655.37	37.74	4.88
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - SIX SHOOTER comp stat	comp				250289.00	4105385.00	TR207	0.552024	6.71	655.37	37.74	3.66
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - SIX SHOOTER comp stat	comp				250289.00	4105385.00	TR208	0.552024	6.71	655.37	37.74	3.66
yes (not known; conservatively assumed to increment consuming)	none	Red Cedar - SIX SHOOTER comp stat					250289.00	4105385.00	TR209	0.028191	7.67	655.37	37.74	4.88
yes (not known; conservatively assumed to increment consuming)	none	Red Willow - BOX CANYON	comp				252642.00	4099824.00	TR210	0.143543	2.13	949.82	1.02	0.91
yes (not known; conservatively assumed to increment consuming)	none	Red Willow - FLORIDA MESA	comp				248875.00	4110277.00	TR211	1.07298	0.15	778.15	64.91	1.22
yes (not known; conservatively assumed to increment consuming)	none	Red Willow - HAT PARK	comp				247842.00	4100005.00	TR212	0.202802	6.50	510.93	6.81	4.04
yes (not known; conservatively assumed to increment consuming)	none	Red Willow - SOUTE 32-8 #2-4	comp				261573.00	4102818.00	TR213	0.143543	2.13	949.82	1.02	0.91
yes (not known; conservatively assumed to increment consuming)	none	Red Willow - SOUTE 33-10 #23-2	comp				242431.00	4108802.00	TR214	0.143543	2.13	949.82	1.02	0.91
yes (not known; conservatively assumed to increment consuming)	none	Red Willow - SOUTE 33-9 #12-2	comp				253681.00	4111689.00	TR215	0.143543	2.13	949.82	1.02	0.91
yes (not known; conservatively assumed to increment consuming)	none	Red Willow - SOUTE 33-9#25-1	comp				253550.00	4106182.00	TR216	0.143543	2.13	949.82	1.02	0.91
yes (not known; conservatively assumed to increment consuming)	none	Red Willow - SOUTE33-10 #15-1	comp				239888.00	4102345.00	TR217	0.143543	2.13	949.82	1.02	0.91
yes (not known; conservatively assumed to increment consuming)	none	Red Willow - TRAIL CANYON	comp				252775.00	4103619.00	TR218	0.162241	6.60	522.04	15.17	4.04
yes (not known; conservatively assumed to increment consuming)	none	Red Willow - TRAIL CANYON	comp				252775.00	4103619.00	TR219	0.601789	0.97	499.82	13.32	3.66
yes (not known;	none	SG Interests - IGNACIO	comp				266432.00	4104330.00	TR220	0.888876	6.71	655.37	37.74	3.66

Startup after 3/1989	SCSE	PNME	DSC3	EPDS	DSC4	SD07	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
conservatively assumed to increment consuming)		CENTRALFacility												
yes (not known; conservatively assumed to increment consuming)	none	SG Interests - IGNACIO CENTRALFacility	comp				266432.00	4104330.00	TR221	0.888876	6.71	655.37	37.74	3.66
yes (not known; conservatively assumed to increment consuming)	none	SG Interests - SPRING GULCH cdp	comp				243000.00	4112000.00	TR222	0.742168	4.88	833.15	3.16	0.76
yes (not known; conservatively assumed to increment consuming)	none	Texaco* - SOUTHERN UTE water disp					249965.00	4105035.00	TR223	0.103558	6.60	522.04	15.17	4.04
yes (not known; conservatively assumed to increment consuming)	none	Texaco* - UTE C					249965.00	4105035.00	TR224	0.184104	2.13	949.82	1.02	0.91
yes (not known; conservatively assumed to increment consuming)	none	Texaco* - UTE E					249965.00	4105035.00	TR225	0.184104	2.13	949.82	1.02	0.91
yes; construction started in 1989 according to EPA permit	none	Vastar - TREATSITE 1	Ariel JGH-4 Comp. Unit A				263139.00	4099660.00	TR226	0.311538	8.97	823.71	34.63	3.66
yes; construction started in 1989 according to EPA permit	none	Vastar - TREATSITE 1	Ariel JGH-4 Comp. Unit B				263139.00	4099660.00	TR227	0.311538	8.94	823.71	34.63	3.66
yes; construction started in 1989 according to EPA permit	none	Vastar - TREATSITE 1	Nat'l J100(T) Chg Pmp				263139.00	4099660.00	TR228	0.205103	2.51	810.37	62.76	0.91
yes; construction started in 1989 according to EPA permit	none	Vastar - TREATSITE 1	Lima 35 KW Generator				263139.00	4099660.00	TR229	0.120818	2.21	977.59	41.39	0.91
yes; construction started in 1990 according to EPA permit	none	Vastar - TREATSITE 2	Ariel JGH-4 Comp. Unit A				255851.00	4099095.00	TR230	0.311826	8.89	823.71	34.63	3.66
yes; construction started in 1990 according to EPA permit	none	Vastar - TREATSITE 2	Ariel JGH-4 Comp. Unit B				255851.00	4099095.00	TR231	0.311826	8.92	823.71	34.63	3.66
yes; construction started in 1990 according to EPA permit	none	Vastar - TREATSITE 2	Lim 35 KW Generator				255851.00	4099095.00	TR232	0.120818	2.29	977.59	41.39	0.91
yes; construction started in 1989 according to EPA permit	none	Vastar - TREATSITE 4	Ariel JGH-4 Comp. Unit C				250991.00	4098849.00	TR233	0.188706	8.93	858.15	49.59	2.44
yes; construction started in 1989 according to EPA permit	none	Vastar - TREATSITE 4	Ariel JGE-2 Comp. Unit A				250991.00	4098849.00	TR234	0.188706	7.70	858.15	49.59	2.44
yes; construction started in 1989 according to EPA permit	none	Vastar - TREATSITE 4	Ariel JGE-2 Comp. Unit B				250991.00	4098849.00	TR235	0.321031	2.90	977.59	83.24	1.22
yes; construction started in 1989 according to EPA permit	none	Vastar - TREATSITE 4	Natl. J165H(T) Wtr Pmp Unit A				250991.00	4098849.00	TR236	0.459972	4.11	818.71	57.76	1.22
yes; construction started in 1989 according to EPA permit	none	Vastar - TREATSITE 4	Compressor				250991.00	4098849.00	TR237	0.310675	2.86	977.59	83.24	3.66
yes; construction started in 1989 according to EPA permit	none	Vastar - TREATSITE 5	Ariel JGH-4 Comp. Unit C				250102.00	4100036.00	TR238	0.099531	8.81	831.48	49.62	1.83
yes; construction started in	none	Vastar - TREATSITE 5	Ariel JGE-2 Comp. Unit D				250102.00	4100036.00	TR239	0.701896	3.96	831.48	49.62	1.83

Startup after 3/1989	SCSE	PNME	DSC3	EPDS	DSC4	SD07	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
1989 according to EPA permit														
yes; construction started in 1989 according to EPA permit	none	Vastar - TREATSITE 5	Ariel JGW-2 Comp. Unit A				250102.00	4100036.00	TR240	0.313839	5.39	823.71	34.63	3.66
yes; construction started in 1989 according to EPA permit	none	Vastar - TREATSITE 5	Ariel JGW-2 Comp. Unit B				250102.00	4100036.00	TR241	0.190432	4.09	858.15	49.53	2.44
yes; construction started in 1989 according to EPA permit	none	Vastar - TREATSITE 5	Kato 55 KW Generator				250102.00	4100036.00	TR242	0.178926	2.87	828.71	48.13	0.91
yes; construction started in 1989 according to EPA permit	none	Vastar - TREATSITE 5A*	Ariel JGH-4 Comp. Unit A				250102.00	4100036.00	TR243	0.603803	7.01	858.15	49.62	3.66
yes; construction started in 1990 according to EPA permit	none	Vastar - TREATSITE 6	Ariel JGK-4 Comp.				250102.00	4100036.00	TR244	0.313839	5.39	823.71	34.63	3.66
yes; construction started in 1990 according to EPA permit	none	Vastar - TREATSITE 6	Ariel JGH-4 Comp. Unit A				250102.00	4100036.00	TR245	0.313839	5.39	823.71	34.63	3.66
yes; construction started in 1990 according to EPA permit	none	Vastar - TREATSITE 6	water pump				250102.00	4100036.00	TR246	0.244225	8.92	701.48	112.29	1.22
yes; construction started in 1990 according to EPA permit	none	Vastar - TREATSITE 6	Natl. J275H(Q) Wtr Pmp Unit A				250102.00	4100036.00	TR247	0.466588	4.08	818.71	57.67	0.76
yes; construction started in 1990 according to EPA permit	none	Vastar - TREATSITE 6	Lima 35 KW Generator				250102.00	4100036.00	TR248	0.120818	3.63	977.59	41.33	0.91
yes; construction started in 1990 according to EPA permit	none	Vastar - TREATSITE 6	compressor				250102.00	4100036.00	TR249	0.554613	5.79	677.59	54.53	3.66
yes; construction started in 1990 according to EPA permit	none	Vastar - TREATSITE 6B*	Ariel JGK-4 Comp. A				246903.00	4103146.00	TR250	0.510313	8.84	873.71	34.63	3.66
yes; construction started in 1990 according to EPA permit	none	Vastar - TREATSITE 6B*	Ariel JGD-4 Comp. Unit D				246903.00	4103146.00	TR251	0.431493	8.84	722.04	30.48	3.66
yes; construction started in 1990 according to EPA permit	none	Vastar - TREATSITE 6B*	Lima Generator				246903.00	4103146.00	TR252	0.205103	2.51	810.37	62.76	0.91
yes; construction started in 1989 according to EPA permit	none	Vastar - TREATSITE 7	Ariel JGH-4 Comp. Unit C				240585.00	4102266.00	TR253	0.31499	5.39	823.71	34.63	3.66
yes; construction started in 1989 according to EPA permit	none	Vastar - TREATSITE 7	water pump				240585.00	4102266.00	TR254	0.244801	4.09	701.48	112.38	1.22
yes; construction started in 1989 according to EPA permit	none	Vastar - TREATSITE 7	water pump				240585.00	4102266.00	TR255	0.18094	4.06	831.48	49.53	0.91
yes; construction started in 1989 according to EPA permit	none	Vastar - TREATSITE 7	compressor				240585.00	4102266.00	TR256	0.699882	2.77	831.48	49.90	1.83
yes; construction started in 1989 according to EPA permit	none	Vastar - TREATSITE 7	compressor				240585.00	4102266.00	TR257	0.100106	4.11	831.48	49.90	1.83
yes; construction started in	none	Vastar - TREATSITE 7	Kato 55 KW Generator				240585.00	4102266.00	TR258	0.466588	4.11	828.71	57.79	1.22

Startup after 3/1989	SCSE	PNME	DSC3	EPDS	DSC4	SD07	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
1989 according to EPA permit														
yes; construction started in 1989 according to EPA permit	none	Vastar - TREATSITE 7B*	Ariel JGK-4 Comp. A				240080.00	4103180.00	TR259	0.510313	2.51	810.37	62.76	3.66
yes; construction started in 1989 according to EPA permit	none	Vastar - TREATSITE 7B*	generator				240080.00	4103180.00	TR260	0.120818	2.29	977.59	41.39	0.91
yes; construction started in 1989 according to EPA permit	none	Vastar - TREATSITE 7B*	compressor				240080.00	4103180.00	TR261	0.382591	5.77	880.37	54.53	3.66
yes; construction started in 1989 according to EPA permit	none	Vastar - TREATSITE 7B*	compressor				240080.00	4103180.00	TR262	0.382591	5.77	880.37	54.53	3.66
yes (not known; conservatively assumed to increment consuming)	none	Vastar - TREATSITE 8*	Ariel JGH-4 Comp. Unit A				239151.00	4107335.00	TR263	0.45278	8.81	634.26	34.63	1.83
yes (not known; conservatively assumed to increment consuming)	none	Vastar - TREATSITE 8*	Ariel JGH-4 Comp. Unit B				239151.00	4107335.00	TR264	0.45278	8.81	634.26	10.55	1.83
yes (not known; conservatively assumed to increment consuming)	none	Vastar - TREATSITE 8*	Ariel GJK-4 Comp. Unit C				239151.00	4107335.00	TR265	0.512039	8.84	873.71	34.63	3.66
yes (not known; conservatively assumed to increment consuming)	none	Vastar - TREATSITE 8*	Ariel JGD-4 Comp. Unit D				239151.00	4107335.00	TR266	0.431493	8.84	722.04	30.48	3.66
yes (not known; conservatively assumed to increment consuming)	none	Vastar - TREATSITE 8*	Natl. J275H(Q) Inj Pmp Unit A				239151.00	4107335.00	TR267	0.242787	2.77	701.48	49.90	1.22
yes (not known; conservatively assumed to increment consuming)	none	Vastar - TREATSITE 8*	Natl. J275H(Q) Inj Pmp Unit B				239151.00	4107335.00	TR268	0.242787	2.77	701.48	49.90	1.22
yes (not known; conservatively assumed to increment consuming)	none	Vastar - TREATSITE 8*	Worthington D1012 Trf Pmp A				239151.00	4107335.00	TR269	0.262923	2.51	810.37	62.76	0.91
yes (not known; conservatively assumed to increment consuming)	none	Vastar - TREATSITE 8*	Lima 35 KW Generator				239151.00	4107335.00	TR270	0.120818	3.79	977.59	41.33	0.91
yes; construction started in 1991 according to EPA permit	none	Vastar - TREATSITE 9	Ariel JGE-2 Comp. Unit A				236735.00	4106828.00	TR271	0.187268	7.62	858.15	49.62	2.44
yes; construction started in 1991 according to EPA permit	none	Vastar - TREATSITE 9	Ariel JGE-2 Comp. Unit B				236735.00	4106828.00	TR272	0.187268	7.70	858.15	49.62	2.44
yes; construction started in 1991 according to EPA permit	none	Vastar - TREATSITE 9	Lima 35 KW Generator				236735.00	4106828.00	TR273	0.117941	3.81	977.59	41.33	0.91
yes; construction started in 1991 according to EPA permit	none	Vastar - TREATSITE 9	Ariel JGE-2 Comp. Unit C				236735.00	4106828.00	TR274	0.18698	7.62	858.15	41.39	2.44
yes; construction started in 1991 according to EPA permit	none	Vastar - TREATSITE 9B*	Ariel JGK-4 Comp. Unit A				235022.00	4106490.00	TR275	0.552024	5.77	677.59	54.53	3.66
yes; construction started in 1991 according to EPA permit	none	Vastar - TREATSITE 9B*	Generac 50KW Generator				235022.00	4106490.00	TR276	0.046026	1.52	560.93	1.00	1.22
yes (not known;	none	Williams - Bondad 33-9	comp				247440.00	4111230.00	TR277	0.18094	1.22	413.71	36.58	1.83

Startup after 3/1989	SCSE	PNME	DSC3	EPDS	DSC4	SD07	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
conservatively assumed to increment consuming)		# 32												
yes (not known; conservatively assumed to increment consuming)	none	Williams - BONDAD 33-9 #33	comp				253600.00	4109430.00	TR278	0.348071	3.05	560.93	33.53	1.22
yes (not known; conservatively assumed to increment consuming)	none	Williams - BONDAD 33-9#26	comp				251410.00	4110020.00	TR279	0.100682	0.91	616.48	27.43	0.91
yes (not known; conservatively assumed to increment consuming)	none	Williams - BONDAD 33-9#6	comp				245610.00	4112030.00	TR280	0.535052	1.22	547.04	41.15	1.83
yes (not known; conservatively assumed to increment consuming)	none	Williams - BONDAD 33-9#7	comp				245610.00	4112030.00	TR281	0.348071	3.05	560.93	33.53	1.22
yes (not known; conservatively assumed to increment consuming)	none	Williams - BONDAD33-10#16	comp				245610.00	4112030.00	TR282	0.18094	2.44	519.26	27.43	1.83
yes	080070024	AMOCO PRODUCTION CO PARGIN MTN COMP STN	ICE CAT G379 415HP COMP	95AC630	ICE CAT G379 415 HP		289291.15	4112679.98	070024a	0.000000	5.18	255.22	32.71	0.21
yes	080070029	AMOCO PRODUCTION COMPANY	CATERPILLAR G3304NA	98AC0262.XP	CATERPILLAR G3304NA	98134	281680.85	4099117.83	070029a	0.273315	3.66	533.00	30.48	0.30
yes	080670244	S G INTERESTS I LTD	CATERPILLAR 398TA MOD JRG	96LP907.CANC	CATERPILLAR 398TA 205005	97107	243659.87	4111476.72	670244a	0.000000	4.88	833.00	3.14	0.76
yes	080670244	S G INTERESTS I LTD	AJAX DPC 360LE SN 403660	97LP0140.CANC	AJAX DPC 360LE SN 403660	97302	243659.87	4111476.72	670244b	0.000000	6.10	533.00	15.79	0.34
yes	080670244	S G INTERESTS I LTD	WAUKESHA L5790GL	98LP0602	WAUKESHA L5790GL	98358	243659.87	4111476.72	670244c	0.454565	5.49	533.00	36.24	0.30
yes	080670078	PALO PETROLEUM	FORD CSG-649	91LP559	FORD CSG-640	92083	235437.44	4105374.42	670078a	0.440181	1.52	533.00	2.19	0.61
yes	080670077	PALO PETROLEUM	FORD CSG-649	91LP558	FORD CSG - 649	92077	235487.66	4106977.31	670077a	0.440181	1.52	644.11	22.04	0.06
yes	080670079	PALO PETROLEUM	FORD CSG-649 75 HP COMPRE	91LP560	FORD CSG-649 75 HP COMPRE	92083	233831.59	4105424.87	670079a	0.440181	1.83	644.11	22.04	0.06
no	080670126	44 CANYON LLC C/O HALLWOOD PETROLEUM INC	(4) AJAX E42 38HP ENGINES	CANCELLED	(4) AJAX E42 38HP ENGINES		248115.39	4125750.70	670126a	0.000000	0.30	560.78	39.35	0.08
yes	080670037	AMOCO PRODUCTION CO S UTE 23 2	(2)WAUKESHA VRG-220 ENGS.	XP	(2)WAUKESHA VRG-220 ENGS.		271072.28	4117442.99	670037a	0.258930	2.44	699.67	7.74	0.15
no	080670145	WILLIAMS FIELD SVCS 33 7 24 STEAMER	CIP 50BBL/DAY STEAMER	CANCEL	CIP 50BBL/DAY STEAMER		264456.12	4111240.12	670145a	0.000000	4.57	421.89	0.00	0.15
no	080670111	FUEL RESOURCES DEV CO MCCULLOCH 28 1	FORD CSG-649 46HP ENGINE	NEW.CANCELLED 5/92	FORD CSG-649 46HP ENGINE		238585.81	4107220.26	670111a	0.000000	0.61	644.11	13.72	0.08
yes	080670111	FUEL RESOURCES DEV CO MCCULLOCH 28 1	AJAX DP-70 60HP ENGINE	AJAX DP-70 60HP ENGINE	AJAX DP-70 60HP ENGINE		238585.81	4107220.26	670111b	0.066171	0.61	560.78	51.79	0.08
no	080670044	WILLIAMS FIELD SVCS BONDAD 33 9 NO7 WELL	CATERPILLAR 3304 ENG 70HP	89LP013	CAT 3304 70HP COMPRESSOR		253006.55	4110025.28	670044a	0.285686	2.13	844.11	11.89	0.10
no	080670103	44 CANYON LLC C/O HALLWOOD PETROLEUM INC	FORD LSG-423 25HP ENGINE	XP.CANC	FORD LSG-423 25HP ENGINE		229132.94	4113906.00	670103a	0.000000	0.30	644.11	17.04	0.08
yes	080670103	44 CANYON LLC C/O	WAUKESHA	93LP203-1	WAUKESHA F817,SN:		229132.94	4113906.00	670103b	0.156797	4.57	560.78	6.61	0.15

Startup after 3/1989	SCSE	PNME	DSC3	EPDS	DSC4	SD07	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
		HALLWOOD PETROLEUM INC	F817,SN: 308602		308602									
yes	080670103	44 CANYON LLC C/O HALLWOOD PETROLEUM INC	WAUKESHA F817, SN: 171303	93LP203-2	WAUKESHA F817, SN: 171303		229132.94	4113906.00	670103c	0.156797	4.57	560.78	6.61	0.15
yes	080670103	44 CANYON LLC C/O HALLWOOD PETROLEUM INC	FORD CSG-649 SN:17772 ICE	98LP0650.XP	FORD CSG-649 SN:17772 ICE	98287	229132.94	4113906.00	670103d	0.068188	1.52	1053.00	21.15	0.08
yes	080670229	APACHE CORPORATION	ICE WAUKESHA VRG 220	96LP119.XP	NAT GAS FIRED		244188.16	4117477.22	670229a	0.077679	1.83	838.56	35.45	0.06
yes	080670106	FUEL RESOURCES DEV CO HIGH FLUME 10 9	FORD CSG-649 46HP ENGINE	93LP205-1.XP CANC 5/95	FORD CSG-649 46HP ENGINE		240338.50	4111948.60	670106a	0.000000	0.61	644.11	13.78	0.08
yes	080670106	FUEL RESOURCES DEV CO HIGH FLUME 10 9	EVAPORATOR HEATER	EVAPORATOR HEATER	EVAPORATOR HEATER		240338.50	4111948.60	670106b	0.081995	6.10	699.67	3.54	0.10
no	080670106	FUEL RESOURCES DEV CO HIGH FLUME 10 9	AJAX DPC-300 243HP ENGINE	CANCELLED (DUPLICATE)	AJAX DPC-300 243HP ENGINE		240338.50	4111948.60	670106c	0.000000	6.10	521.89	13.72	0.25
no	080670118	44 CANYON LLC C/O HALLWOOD PETROLEUM INC	(3) FORD/CSG649 ENG	CANCELLED	(3) FORD CSG-649 ENGINES		246829.70	4113355.53	670118a	0.000000	0.61	644.11	21.15	0.08
no	080670118	44 CANYON LLC C/O HALLWOOD PETROLEUM INC	(2) AJAX E-42 38HP ICE'S	CANCELLED	(2) AJAX E-42 38HP ICE'S		246829.70	4113355.53	670118b	0.000000	0.30	560.78	39.35	0.08
yes	080670113	FUEL RESOURCES DEV CO SAWMILL CANYON	(2) AJAX DP-60 ENGINES	(2) AJAX DP-60 ENGINES	(2) AJAX DP-60 ENGINES		237328.45	4118429.08	670113a	0.112203	0.61	560.78	51.79	0.08
no	080670113	FUEL RESOURCES DEV CO SAWMILL CANYON	(7) AJAX E-42 ENGINES38HP	NEW.CANC	(7) AJAX E-42 ENGINES38HP		237328.45	4118429.08	670113b	0.000000	0.61	560.78	39.35	0.08
no	080670123	44 CANYON LLC C/O HALLWOOD PETROLUEM INC	WAUKESHA VR310 ENGINE	CANCELLED	WAUKESHA VRG-310		248115.39	4125750.70	670123a	0.000000	4.57	560.78	8.53	0.17
no	080670250	DURANGO CONSTRUCTION CO	MIX ASPHALT PLANT BARBER	82LP136	ASPHALT PRODUCTION		248607.18	4141286.19	670250a	0.008919	9.14	366.33	3.23	2.29
no	080670033	AMOCO PRODUCTION CO MAYFIELD COMP STA	CAT 415HP MAYFIELD 1	88LP048-3	CAT 415HP MAYFIELD 1		259902.98	4120499.96	670033a	0.000000	0.91	699.67	30.48	0.37
no	080670124	44 CANYON LLC C/O HALLWOOD PETROLEUM INC	WAUKESHA 330 ENGINE 47HP	CANCELLED	WAUKESHA 130 ENGINE 47HP		248996.13	4125508.39	670124a	0.000000	0.30	560.78	37.22	0.08
yes	080670124	44 CANYON LLC C/O HALLWOOD PETROLEUM INC	AJAX DPC 360 ENGINE	95LP887	AJAX SN:403673 MD:DPC-360		248996.13	4125508.39	670124b	0.333732	6.71	644.11	13.20	0.34
yes	080670124	44 CANYON LLC C/O HALLWOOD PETROLEUM INC	FORD LSG 875 ENGINE	93LP320-1.CANC	FORD LSG-875 ENGINE		248996.13	4125508.39	670124c	0.000000	0.30	644.11	17.25	0.08
yes	080670117	FUEL RESOURCES DEV CO DEER CANYON UTE 16	WAUKESHA 135 47HP #66486	WAUKESHA 135 47HP #66486	WAUKESHA 135 47HP #66486		229029.88	4110700.01	670117a	0.207144	0.61	560.78	56.94	0.08
yes	080670143	WILLIAMS FIELD SVCS 33 8 5 STEAMER	CIP 50 BBL/DAY STEAMER	CIP 50 BBL/DAY STEAMER	CIP 50 BBL/DAY STEAMER		259642.56	4111376.00	670143a	0.017262	4.57	421.89	30.48	0.15
no	080670144	WILLIAMS FIELD SVCS 33 8 22 STEAMER	CIP 50 BBL/DAY STEAMER	CANCEL	CIP 50 BBL/DAY STEAMER		254804.33	4111515.36	670144a	0.000000	4.57	421.89	0.00	0.15

Startup after 3/1989	SCSE	PNME	DSC3	EPDS	DSC4	SD07	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
no	080670043	WILLIAMS FIELD SVCS LATERAL 2 B STA	CUMMINS 140HP LATERAL	89LP012	CUMMINS 140 HP LATERAL		236006.25	4112484.31	670043a	0.428673	2.44	921.89	30.48	0.09
yes	080670090	WILLIAMS FIELD SVCS BONDAD 33 9 11	CATERPILLAR COMPRESSOR	92LP276	CATERPILLAR COMPRESSOR		249990.65	4111656.76	670090a	0.435002	2.13	963.56	0.94	0.10
yes	080670089	WILLIAMS FIELD SVCS BONDAD 33 9 5	WAUKESHA1197 115HP ENGINE	92LP274	WAUKESHA1197 115HP ENGINE		250038.21	4113259.72	670089a	0.382641	1.52	866.33	16.95	0.10
yes	080670085	WILLIAMS FIELD SVCS IGNACIO 33 7 18	CATERPILLAR 3304 ENGINE	92LP187	CATERPILLAR 3304 ENGINE		267645.64	4109547.61	670085a	0.287700	2.13	866.33	11.89	0.10
yes	080670084	WILLIAMS FIELD SVCS MCCARVILLE 1 STA	CATERPILLAR 3304 70HP ICE	92LP226	CATERPILLAR 3304 70HP ICE		261157.22	4108155.55	670084a	0.287700	2.13	866.33	11.89	0.10
yes	080670087	WILLIAMS FIELD SVCS BONDAD 33 9 10	CATERPILLAR 3306 90HP ICE	92LP275	CATERPILLAR 3306 90HP ICE		248434.00	4113307.47	670087a	0.379764	2.13	844.11	17.98	0.10
no	080670053	HOOD MORTUARY	ALL MDL L1701 SN CR190294	89LP419	ALL MDL L1701 SNCR190294		244021.83	4129021.74	670053a	0.001331	4.88	1170.78	6.19	0.52
no	080670053	HOOD MORTUARY	ALL MDL L1701 SN CR190294	89LP419	NAT GAS COMBUSTION		244021.83	4129021.74	670053b	0.002877	4.88	1170.78	6.19	0.52
yes	080670212	TEXACO EXPLORATION & PROD UTE E WEEL NO2	WAUKESHA VRG330 NO. 40262	95LP696.XP	WAUKESHA VRG-330 SN 40262	95351	227799.27	4110863.07	670212a	0.182771	2.13	533.00	12.16	0.91
yes	080670213	TEXACO EXPLORATION & PROD UTE C WELL NO2	WAUKESHA VRG330 SN 402613	95LP697.XP	WAUKESHA VRG330 SN 402613	95321	219395.93	4110891.69	670213a	0.182771	2.13	533.00	12.16	0.09
no	080670215	MARKWEST RESOURCES INC	AJAX DPC 140	95LP749-1.CANC	AJAX DPC 140	95321	251004.74	4104993.69	670215a	0.000000	4.88	527.44	6.71	0.30
no	080670215	MARKWEST RESOURCES INC	ICE AJAX DPC 180 144 HP	96LP579.CANC	ICE AJAX DPC 180 144 HP	97006	251004.74	4104993.69	670215b	0.000000	6.40	533.00	8.14	0.34
yes	080670215	MARKWEST RESOURCES INC	ICE AJAX DPC-230 184 HP	97LP0440	NAT. GAS		251004.74	4104993.69	670215c	0.153344	4.88	499.67	11.37	0.30
yes	080670127	AMOCO PRODUCTION - SO. UTE TRIBAL F#1	WAUKESHA ENGINE, 401574	92LP080-1	NATURAL GAS COMBUSTION	93208	267509.84	4104615.81	670127a	0.160019	2.44	921.89	7.74	0.15
yes	080670128	AMOCO PRODUCTION CO J.W.WARD GU A#1	WAUKESHA ENGINE 400019	92LP080-2.XP	NATURAL GAS COMBUSTION	93208	256394.25	4112672.48	670128a	0.160019	2.44	921.89	7.74	0.15
yes	080670129	AMOCO PRODUCTION CO LEMO 17U-01 UNIT #1	WAUKESHA ENGINE 399752	92LP080-3.XP	NATURAL GAS COMBUSTION	93208	256796.36	4118892.60	670129b	0.160019	2.44	921.89	7.74	0.15
yes	080670209	PABLO OPERATING CO	FORD VSG 4131 27HP 6007B	95LP454	PUMP JACK ENGINE	96095	260001.11	4107478.81	670209a	0.074802	2.44	294.11	7.62	0.15
yes	080670210	PABLO OPERATING CO	FORD VSG 4131 00698 GO5	95LP462.XP	FORD VSG 4131 SN 00698 GO	96095	260999.43	4107820.74	670210a	0.074802	2.44	294.11	7.62	0.15
yes	080670098	EMERALD GAS OPERATING COMPANY	AJAX DPC360LE	92LP1307	AJAX DPC360LE		244410.79	4118303.51	670098a	0.162019	6.10	521.89	26.94	0.24
yes	080670130	AMOCO PRODUCTION CO ROBERT DULIN G.U.#1	WAUKESHA ENGINE 399749	92LP080-4.XP	NATURAL GAS COMBUSTION	93208	269606.32	4126089.31	670130a	0.160019	2.44	921.89	7.74	0.15
yes	080670131	AMOCO PRODUCTION CO PINE RIVER 02-29	WAUKESHA ENGINE 396325	92LP080-5.XP	NATURAL GAS COMBUSTION	93208	276290.79	4115976.31	670131a	0.160019	2.44	921.89	7.74	0.15

Startup after 3/1989	SCSE	PNME	DSC3	EPDS	DSC4	SD07	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
yes	080670132	AMOCO PRODUCTION CO ROBERT DULIN G.U.C#1	WAUKESHA ENGINE 400012	92LP080-6.XP	NATURAL GAS COMBUSTION	93208	272491.01	4127892.28	670132a	0.160019	2.44	921.89	7.74	0.15
yes	080670133	AMOCO PRODUCTION CO PICCOLI G.U.A #1	WAUKESHA ENGINE 400013	92LP080-7.XP	NATURAL GAS COMBUSTION	93208	251289.07	4118806.80	670133a	0.160019	2.44	921.89	7.74	0.15
yes	080670239	AMOCO PRODUCTION CO SOUTH EAST TIFFANY	WAUKESHA L5788G 460 HP	96LP580	WAUKESHA L5788G	96343	274206.10	4099869.18	670239a	0.376887	2.44	294.11	7.62	0.15
yes	080670134	AMOCO PRODUCTION CO RAYMOND KOON GUA6#1	WAUKESHA VRG 330, 400793	92LP080-8.XP	NATURAL GAS COMBUSTION	93208	244490.20	4108705.57	670134a	0.160019	2.44	921.89	7.74	0.15
yes	080670135	AMOCO PRODUCTION CO MCCAW G.U. D#1	WAUKESHA VRG 330, 399859	92LP080-9.XP	NATURAL GAS COMBUSTION	93208	257095.73	4115582.89	670135a	0.160019	2.44	921.89	7.74	0.15
yes	080670136	AMOCO PRODUCTION CO HELEN CRAIG G.U.#1	WAUKESHA VRG 330, 389779	92LP080-10.XP	NATURAL GAS COMBUSTION	93208	248808.52	4120886.01	670136a	0.160019	2.44	921.89	7.74	0.15
no	080670013	MERCY MEDICAL CTR	SHENANDOAH P25-2GN	88LP265	SHENANDOAH P25-2GN	89009	245206.82	4129880.46	670013a	0.001010	7.01	928.00	7.13	0.46
no	080670013	MERCY MEDICAL CTR	C-BROOKS BOILER SN:47334	CLEAVER BROOKS BOILER	NATURAL GAS USAGE		245206.82	4129880.46	670013b	0.036985	21.34	466.33	4.08	0.61
no	080670013	MERCY MEDICAL CTR	C-BROOKS BOIL SN:47335	CLEAVER BROOKS BOILER	NATURAL GAS USAGE		245206.82	4129880.46	670013c	0.036985	21.34	466.33	0.91	0.61
yes	080670228	APACHE CORP	WAUKESHA VRG 220 SN 38889	97LP0243.XP	WAUKESHA VRG 220 MN ARIEL	97122	254864.90	4112747.60	670228a	0.077679	2.13	838.56	35.45	0.06
yes	080670227	APACHE CORP	WAUKEHSA 220 SN:396333	97LP0245.XP	WAUKESHA 220 SN:396333	97122	257847.88	4103067.14	670227a	0.077679	2.13	838.56	35.45	0.06
yes	080670246	APACHE CORP	WAUKESHA VRG22 SN:398981	97LP0244	WAUKESHA VRG22 SN:398981	97122	262538.20	4098368.61	670246a	0.077679	2.13	838.56	35.45	0.06
yes	080670137	AMOCO PRODUCTION CO RICHARDSON G.U.G#1	WAUKESHA VRG 300, 389203	92LP080-11.XP	NATURAL GAS COMBUSTION	93208	260588.75	4125508.90	670137a	0.160019	2.44	921.89	7.74	0.15
yes	080670138	AMOCO PRODUCTION CO HOTTER G.U. A#1	WAUKESHA VRG 330, 389791	92LP080-12.XP	NATURAL GAS COMBUSTION	93208	247301.26	4120005.64	670138a	0.160019	2.44	921.89	7.74	0.15
yes	080670247	WILLIAMS FIELD SVCS	DORMAN DA 85 GDAGT 81HP	97LP303.CANC	DORMAN DA85 GDAGT 81 HP	97143	246844.45	4111380.48	670247a	0.000000	2.13	921.89	32.43	0.08
yes	080670247	WILLIAMS FIELD SVCS	CATERPILLAR CA 95 3306NA	97LP0752	CAT CA 95 3306NA LCR	98027	246844.45	4111380.48	670247b	0.302085	2.74	921.89	33.53	0.09
yes	080670139	AMOCO PRODUCTION CO CONRAD G.U. A#1	WAUKESHA VRG 330, 399842	92LP080-13.XP	NATURAL GAS COMBUSTION	93208	269403.90	4130382.65	670139a	0.160019	2.44	921.89	7.74	0.15
yes	080670140	AMOCO PRODUCTION CO LINDER G.U. A#1	WAUKESHA VRG 330, 399609	92LP080-14.XP	NATURAL GAS COMBUSTION	93208	250001.12	4119492.96	670140a	0.160019	2.44	921.89	7.74	0.15
yes	080670141	AMOCO PRODUCTION CO IGNACIO H2O COLL.SYS	WAUKESHA VRG 330, 386468	92LP080-15.XP	NATURAL GAS COMBUSTION	93208	266811.27	4108861.14	670141aa	0.160019	2.44	921.89	7.74	0.15
yes	080670142	AMOCO PRODUCTION CO BARNES LEIDY	WAUKESHA VRG 330, 389456	92LP080-16.XP	NATURAL GAS COMBUSTION	93208	249805.09	4112896.34	670142a	0.160019	2.44	921.89	7.74	0.15

Startup after 3/1989	SCSE	PNME	DSC3	EPDS	DSC4	SD07	UTM13E	UTM13N	srcid	NOX_gps	StkH_m	StkT_K	StkV_mps	StkD_m
		G.U.A#1												
yes	080670249	LA PLATA COUNTY HUMANE SOCIETY	ANIMAL CREMATOR NAT GAS	97LP0663	PATHOLOGICAL WASTES		245703.72	4124311.62	670249a	0.001151	5.18	699.67	10.15	0.30
no	080670042	ANG/FUEL RES.DEV.CO 44 CANYON COMP.STATN	AJAX ENG. SN: HRM 85-317T	88LP349.CANC	NATURAL GAS COMP. ENG. #1		230697.33	4108733.43	670042a	0.000000	7.32	755.22	17.77	0.30
no	080670042	ANG/FUEL RES.DEV.CO 44 CANYON COMP.STATN	WAUKESHA F3521 ENGINE #2	89LP029	NATURAL GAS COMP.ENG. #2		230697.33	4108733.43	670042b	0.333157	7.32	755.22	17.77	0.30
yes	080670263	S G INTERESTS I LTD	AJAX DPC 360LE SN 403660	98LP0130	AJAX DPC 360LE SN 403660	98135	238822.17	4111656.11	670263a	0.147475	6.10	644.11	15.79	0.34
yes	080670264	SAN JUAN BASIN CONSORTIUM	AJAX M/N DPC 180 SN 75078	98LP0169	AJAX M/N DPC 180 SN 75078	98210	238995.86	4116464.14	670264a	0.457442	0.61	644.11	50.81	0.09
yes	080670265	SAN JUAN BASIN CONSORTIUM	FORD CSG 879 SN 09168C-15	98LP0170.XP	FORD CSG 879 SM 09168C-15	98210	240599.65	4116414.56	670265a	0.184128	0.61	644.11	50.78	0.09
yes	080670266	SAN JUAN BASIN CONSORTIUM	AJAX 8 1/2 CMA SN: 60705	98LP0171.XP	AJAX 8 1/2 CMA SN: 60705	98210	240599.65	4116414.56	670266a	0.109326	0.61	644.11	0.00	0.09
yes	080670267	SAN JUAN BASIN CONSORTIUM	AJAX MN DP60 SJBC-DP60-01	98LP0172.XP	AJAX DP60 SN:SJBC-DP60-01	98210	240599.65	4116414.56	670267a	0.158235	0.61	644.11	50.78	0.09
yes	080670268	SAN JUAN BASIN CONSORTIUM	AJAX E-42 SJBC-CMA-001	98LP0173.XP	AJAX E-42 SN:SJBC-CMA-001	98210	237367.46	4116514.80	670268a	0.115080	0.61	644.11	50.78	0.09
yes	080670269	SAN JUAN BASIN CONSORTIUM	AJAX M/N E-42 SN: 65254	98LP0174	AJAX M/N E-42 SN: 65254	98210	237367.46	4116514.80	670269a	0.115080	0.61	644.11	50.78	0.09
yes	080830065	ERTEL INC ERTEL FUNERAL HOME	CREMATOR A11-1801	97MN0038	CREMATOR UNIT A11-1801		182423.50	4139466.44	830065a	0.000173	5.49	1144.11	6.10	0.52
yes	080830015	SOUTHWEST HEALTH SYSTEM	2 CLEAVER BROOKS BOILERS	96MN939.XP	DIESEL USE		183614.22	4140965.08	830015a	0.011508	1.83	421.89	6.10	0.61
yes	080830015	SOUTHWEST HEALTH SYSTEM	2 CLEAVER BROOKS BOILERS	96MN939.XP	NAT.GAS USE		183614.22	4140965.08	830015b	0.168305	1.83	421.89	6.10	0.61
no	087771021	COLORADO DEPT OF TRANSPORTATION #5010	CEDARAPIDS ASPHALT PLANT	89LP251	ASPHALT HEATER - LP GAS		244973.47	4127881.97	771021a	0.008919	5.49	421.89	12.50	0.55

Key:
SCSE = Plant ID number XXYYYZZZZ where XX=FIPS State, YYY=FIPS County, ZZZZ=NEDS plant Number
PNME = Plant Name
DSC3 = Construction Permit Number
EPDS = Point Description
DSC4 = Segment Description
SD07 = Initial permit approval date [Julian date: YYDDD]
LATITUDE = latitude in decimal degrees
LONGITUDE = longitude in decimal degrees
UTM13E = Zone 13 Universal Tranverse Mercator (UTM) easting (meters)
(UTM 1927,Clarke 1866,Central Meridian=-105,Ref Latitude=0,False Easting=500000,False Northing=0
UTM13N = Zone 13 UTM Northing (meters)
NOX_gps = Estimated Actual Emission Rate as Reported on APEN (grams per second, long-term)
StkH_m = Stack Height (meters)
StkT_K = Stack Gas Exit Temperature (Kelvin)
StkV_mps = Stack Gas Exit Velocity (meters per second)
StkD_m = Stack Diameter (meters)

27. Power Plants In Nearby States Not Included in the Modeling Domain

Due to computational and resource constraints, the study area was limited to a high density emissions area in SW Colorado and NW New Mexico. This section provides a brief description of other power plants outside the study area that might affect PSD increments in SW Colorado. If additional studies are done in this area with larger modeling domains, these facilities should be considered for inclusion. There may be other large NOx source besides power plants that would also need to be considered. The following data and graphics have been obtained and compiled from EPA (http://www.epa.gov/acidrain/emission).

Table 35. Power Plants within a few hundred kilometers of the modeling domain that were NOT included in the modeling.

Facility	1990 Emissions[32] (tons per year)	1996 Emissions (tons per year)	Change (tons per year)
Springerville, AZ	5750	15210	9460
Coronado, AZ	10625	11737	1112
Cholla, AZ	11609	10683	-926
Nucla, CO	407	1160	753
Cameo, CO	1600	1645	45
Hunter (Emery), UT	21523	21618	95
Huntington, UT	15274	16422	1148
TOTAL	63512	45082	**11687**

[32] http://www.epa.gov/acidrain/emission/nm/2451_f.htm

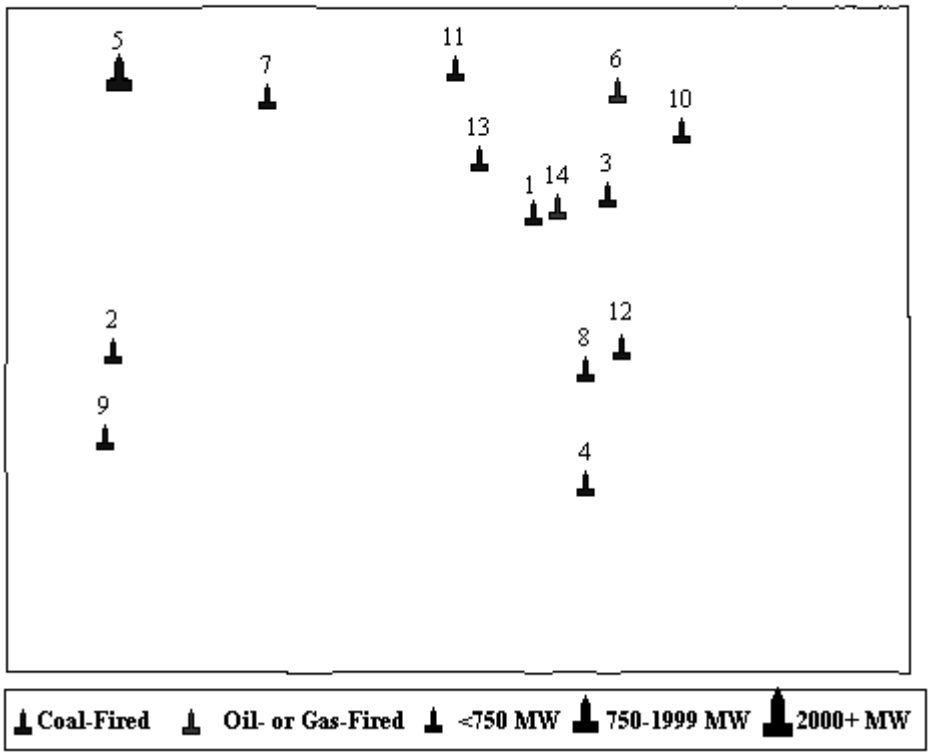


Figure 54. Power Plants in Colorado.

Power Plants
Colorado Summary

1. Arapahoe
2. Cameo
3. Cherokee
4. Comanche
5. Craig
6. Fort St Vrain
7. Hayden
8. Martin Drake
9. Nucla
10. Pawnee
11. Rawhide
12. Ray D Nixon
13. Valmont
14. Zuni

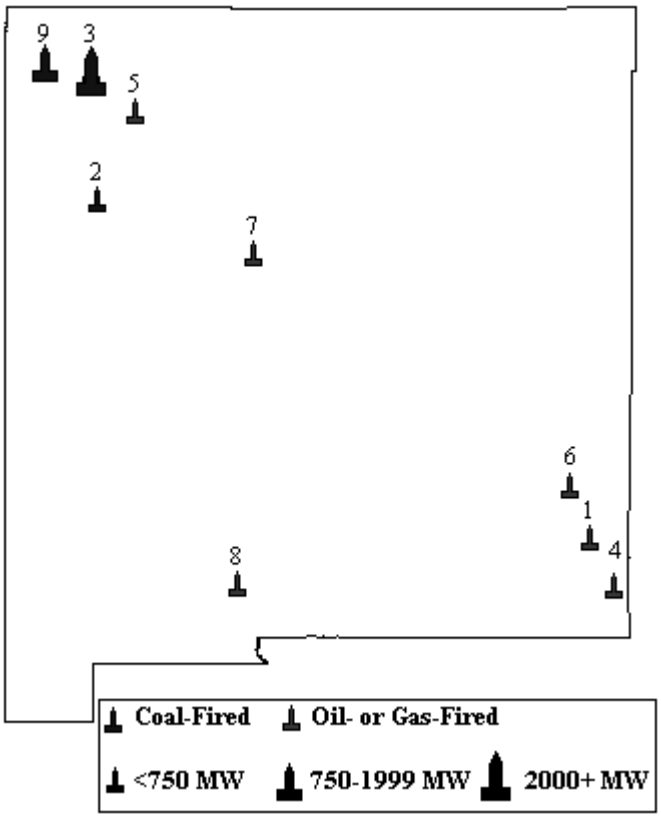


Figure 55. Power Plants in New Mexico.

Power Plants
New Mexico

1. Cunningham
2. Escalante
3. Four Corners
4. Maddox
5. Milagro Cogeneration
6. North Lovingston
7. Reeves
8. Rio Grande
9. San Juan

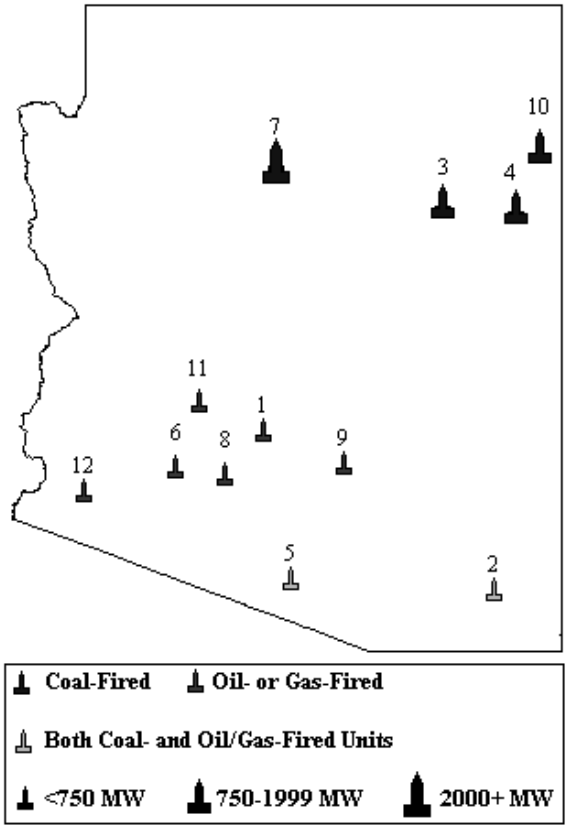


Figure 56. Power Plants in Arizona.

Power Plants

Arizona

1. Agua Fria
2. Apache Station
3. Cholla
4. Coronado
5. Irvington
6. Kyrene
7. Navajo
8. Ocotillo
9. Saguaro
10. Springerville
11. West Phoenix
12. Yuma Axis

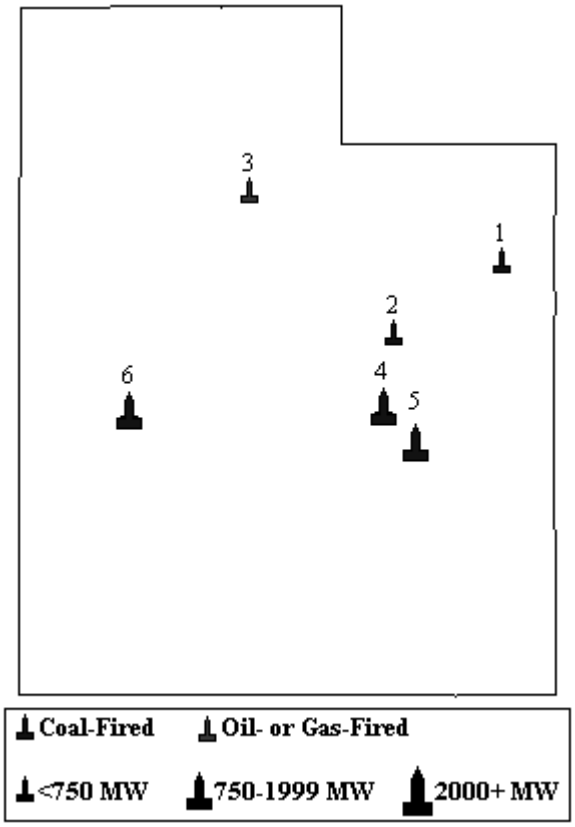


Figure 57. Power Plans in Utah.

Power Plants
Utah

1. Bonanza
2. Carbon
3. Gadsby
4. Hunter (Emery)
5. Huntington
6. Intermountain

28. Public and Peer Review

This report was initially published as a draft report in July 1999. The draft document was published on the Division's Internet site to allow anyone the opportunity to comment. In addition, copies were sent to a representative group of stakeholders, including most of the source operators with the largest NOx sources in the Colorado portion of the study area.[33] A sixty-day review deadline was set. During the review period, written comments were received from Red Cedar Gathering, the New Mexico Environment Department's Air Quality Bureau, and the National Park Service.

The results for the draft report were presented to the Colorado Air Quality Control Commission at the July meeting. In addition, several stakeholders expressed interest in hearing a presentation about the study. Thus, another presentation was given as a follow-up to the Division's July 15, 1999 presentation to the Air Quality Control Commission. The briefing presented the technical findings of the draft PSD study. In addition, the briefing provided interested parties with an open-forum for Q&A and an opportunity to provide comments to the Division on the technical and/or policy issues related to the draft study results.

The New Mexico Air Quality Bureau gave the study a favorable review. Positive comments were also received from the Bureau of Land Management.

28.1. Comments from Red Cedar Gathering Company

Red Cedar Gathering Co. Comment #1: *The APCD asserts their minor source baseline date for NOx (March 30, 1989) applies to sources located within the exterior boundaries of the Southern Ute Indian Reservation. We believe that this jurisdictional issue is open to interpretation and needs to be addressed with affected parties to establish the most appropriate date in Indian country.*

Response: The Division referred this question to U.S. EPA Region VIII for a response. EPA's response follows:

> *…[a party] questioned the Division's statement that the NO_2 minor source baseline date on the Southern Ute Indian reservation in Colorado is considered to be the same as the NO_2 minor source [baseline date] for the State's section 107 area in which the reservation is located. We fully agree with the Division's statement, for the reasons discussed below.*
>
> *In order to determine the applicable minor source baseline date for an area, one needs to review the definitions of "baseline concentration," "minor source baseline date," and "baseline area" in 40 CFR 52.21(b)(13), (14)(ii), and (15), respectively. Once the minor source baseline date is triggered for a specific pollutant and area, the baseline concentration is set for the baseline area (and*

[33] The Division sent copies of the draft phase I report to U.S. EPA Region VIII, U.S. Forest Service, National Park Service, U.S. Bureau of Land Management, Southern Ute Indian Tribe Department of Energy, Colorado Petroleum Association, Environmental Defense Fund, Williams Field Services, Amoco Production Co., El Paso Natural Gas Co., Red Cedar Gathering, and Northwest Pipeline Co.

*thus the total amount of air quality degradation that is allowed in the baseline area is known). The baseline area represents the area in which the minor source baseline date is triggered. Specifically, the baseline area is defined "as any intrastate area (**and every part thereof**) designated as attainment or unclassifiable under section 107(d)(1)(D) or (E) of the [Clear Air] Act in which the major source or major modification establishing the minor source baseline date would construct or which would have an air quality impact equal to or greater than 1 ug/m3 (annual average) of the pollutant for which the minor source baseline date is established" [emphasis added]. Areas designated as attainment or unclassifiable under section 107(d)(1)(D) or (E) of the Act are promulgated in 40 CFR 81.300 et seq.*

For the State of Colorado, the entire State is designated as a section 107 attainment area for NO_2 in 40 CFR 81.306. According to Colorado's Regulation No. 3, the minor source baseline date for NO_2 was triggered for the entire State on 3/30/89 by Amoco-Wattenburg.

In 40 CFR part 81, EPA has not generally promulgated separate attainment or unclassifiable area designations for Indian reservations under section 107 or the Clean Air Act. Thus, unless an Indian Reservation or a portion of it has been designated as a separate section 107 attainment or unclassifiable area in 40 CFR part 81 for a particular pollutant, an Indian reservation is considered part of the State section 107 attainment/unclassifiable area in which it is located for the purposes of determining the applicable minor source baseline date for the reservation. Consequently, we consider the NO_2 minor source baseline date for the Southern Ute Indian reservation to be 3/30/89, just as it is for the State of Colorado.

It is important to note that consideration of the Indian reservation as part of the State section 107 attainment/unclassifiable area designation does not in any way mean that the State has jurisdiction over sources of air pollution located within the exterior boundaries of the reservation. Rather, the tribe has jurisdiction over the sources within the exterior boundaries of the reservation and, in the absence of EPA-approved tribe permitting regulations, EPA has PSD permitting authority over such sources. However, if an Indian reservation is part of a State section 107 attainment/unclassifiable area, EPA does consider the minor source baseline date to be the same for both the reservation and the State, pursuant to the PSD program definitions discussed above.

Red Cedar Gathering Co. Comment #2: *The increment status of Red Cedar's Cox Canyon facility will be determined by establishing install dates for each emissions unit at the facility. Further, a brief review of the source data listed for several Red Cedar facilities indicated that the data may not be accurate. At first glance, it appeared that some source parameters were incorrect, facility configurations have not been updated, and sources may have been double-counted between the AIRS-based sources and the*

SUIT EIS-based sources. Red Cedar encourages the Division to work with Red Cedar to ensure that the data used in the study is representative of Red Cedar's sources.
Response: In order to avoid double counting, the Division used a Geographical Information System (GIS) approach to visualize source locations from all available emission inventories for the study area. Each inventory was plotted on a map and exploratory GIS analysis was used to identify sources that were listed more than once. Thus, there was a deliberate effort to avoid double counting between the AIRS and SUIT EIS inventories. Nevertheless, the Division acknowledges that some double counting may have occurred. In any case, the Division does not believe, and does not have any other information to suggest, that double counting is a significant issue in this study.

With respect to the comment that some source data are not accurate, the Division sent a letter to invite the submission of more accurate data as part of the review process for this study. The letters (sent in mid to late July, 1999) stated the following:

> *The Air Pollution Control Division requests comments on the enclosed draft report on nitrogen dioxide PSD increment consumption in SW Colorado. Comments will be considered for inclusion in the final report. If specific comments are not incorporated into the modeling or report, responses will be added as an appendix to the report.* ***Comments must be received by Friday, September 24th to be considered.*** *Source operators receiving this letter are encouraged to read the section of the report on their sources in the study area and to provide comments about data and assumptions. For example, the Division is particularly interested in obtaining accurate estimates of unit-specific start-up and shut-down dates so that increment consuming sources can be properly identified.*

The Division responded to Red Cedar's comments in a letter dated October 4, 1999. The Division encouraged the submission of corrections to the tables in the report so the Division could correct its databases. As of October 29, 1999, revised data have not been received from any source operators; thus, no changes to source data have been made for the final report. The Division recognizes that it can be difficult for a source operator to provide data in a short time frame. Since the Division is interested in using the most accurate data available, any revised data that are submitted to the Division will be considered for use in the next increment study in this area.

Red Cedar Gathering Co. Comment #3: *Sources addressed in the study have not been treated with equal scrutiny by APCD. For example building downwash effects were not addressed for all sources. Given the sources subject to building downwash effects are known to result in higher ground-level impacts than would occur if the sources operate in the absence of such effects, this inconsistent treatment of downwash effects results in the potential for unequal regulatory requirements for sources considered in the study and casts doubt on the accuracy of the study results. It seems that all sources addressed in the study should receive consistent treatment with representative downwash effects.*
Response: The Division acknowledges that all sources in the study area were not treated with equal scrutiny. In fact, technically-based professional judgement was used to

determine which sources had high enough emissions to merit a refined analysis to estimate hot spot impacts from building downwash. It was beyond the scope of this study to model every source in the study area with building downwash. Building downwash was included for large sources with increment consuming emissions over 100 tons per year. For smaller increment consuming sources, building downwash parameters were used only if they were already available from other studies.

Even though building downwash analyses and hot spot modeling have not been done for all sources and despite the fact that there may be inaccuracies in some data used in the study, the Division believes the study nevertheless provides a reasonable estimate of "existing" increment consumption in the study area. As stated in section 29.2 of this report on "study limitations," refined hot spot modeling for large sources was not done for sources that do not have permits issued by the Division. In fact, many sources on Southern Ute Indian Tribe lands have permits issued by EPA. These and other simplifications were necessary to complete the study in a reasonable time frame with the allocated resources.

Red Cedar Gathering Co. Comment #4: *Section 21 of the report indicates that a source-by-source increment analysis was done for the Red Cedar Gas Gathering facility (SCSE 08670166). However, no modeling results are presented for this facility. Please provide Red Cedar with the modeling results and increment-compliance status for this facility.*
Response: The Division did not perform ISCST3 hot-spot modeling at the Red Cedar facility (SCSE 08670166) in section 21 of the report. That is, the Asource-by-source increment analysis@ for this facility only involved a review of the Division's databases to determine which units at the facility were increment consuming. Based on permit issuance dates, the Division has assumed that all emissions from the facility are increment consuming. Due to resource limitations, the Division only performed hot-spot modeling at facilities emitting more than 100 tons per year (tpy) of nitrogen oxides. Facility 08670166 had an overall actual emission rate of 67 tpy. Thus, for a regional study like this one, it was considered to be too small for a hot-spot analysis.

28.2. Comments from the National Park Service

The National Park Service (NPS) did not make any technical comments on the study. Thus, since only technical comments are being addressed in this report, no response is provided. Since the letter does contain comments regarding the adequacy of Colorado's regulations for preventing significant deterioration of air quality, the NPS comments are reproduced below for reference purposes:

> *We appreciate the opportunity to review and comment on the July 14, 1999, draft report entitled "Air Quality Modeling Study – Periodic Assessment of Nitrogen Dioxide Increment Consumption in Southwest Colorado - Phase I." We realize our concern about minor and major source growth near Class I Mesa Verde National Park (NP) influenced the Air Pollution Control Division's (APCD) decision to undertake the analysis, and we appreciate the APCD's commitment of resources to accomplish the modeling. While the analysis does not allay concerns*

about impacts on air quality related values at Mesa Verde NP, we are pleased the results indicate that nitrogen dioxide (NO_2) increment consumption is not currently and issue at the park given that only 1.09 $\mu g/m^3$ of the 2.5 $\mu g/m^3$ NO_2 Class I increment has been consumed.

Completion of the southwest Colorado increment analysis helps fulfill the Colorado Air Quality Control Commission's requirement for a periodic review of the adequacy of Regulation No. 3 for preventing significant deterioration of air quality (Regulation No. 3, Part B, §VII.A.4.a). We urge the APCD to commit the resources required for completion of similar increment analyses in all areas of the state that are experiencing substantial minor and/or major source growth. Further, because of our increasing concerns about the impacts of existing and proposed sources on Class I Rocky Mountain NP, we encourage the APCD to focus on the northern Front Range for the next NO_2 increment analysis.

Finally, we note that Regulation No. 3 requires a demonstration of compliance with the National Ambient Air Quality Standards prior to permit issuance for both major and minor sources (Regulation No. 3, Part B, §IV.D.1.c). This is a prudent requirement, as it allows modeled NAAQS problems to be identified and mitigated before a source is constructed. We encourage the APCD and the Colorado Air Quality Control Commission to modify Regulation No. 3 and/or the Colorado Modeling Guideline for Air Quality Permits to similarly require proposed minor sources that may significantly consume Class I increments to demonstrate compliance with increments prior to permit issuance. In particular, we believe this requirement should apply to "large" minor sources such as synthetic minors, proposed within 10 km of the boundary of a Class I area. It is possible that such sources could cause increment violations, especially during short-term averaging periods, e.g., the 24-hour or 3-hour sulfur dioxide increments or the 24-hour PM_{10} increment.

29. Summary

29.1. Design Concentrations

The highest annual concentration estimates have been used in the increment compliance demonstrations in this report. This is consistent with EPA recommendations in § 8.2.1 and 11.2.3 of Appendix W of 40 CFR Part 51 (Guideline on Air Quality Models).

29.2. Study Limitations

Limitations of this study are discussed here to help decision-makers interpret the results.

- In this study area, few meteorological observations exist for 1990, the year for which the 80-kilometer resolution MM4 meteorological model data are available. Thus, there are significant uncertainties associated with the meteorological fields developed with the CALMET model. Significant improvements to the meteorological fields could be obtained if finer resolution prognostic fields were developed and if additional meteorological monitoring were performed to validate model performance.
- In the CALMET/CALPUFF modeling, no atmospheric conversion of NO to NO_2 has been assumed; that is, it has been assumed that all emitted NOx exists as NO_2. In addition, it has been assumed there is no deposition. Thus, with respect to atmospheric chemistry, the modeling should tend to overestimate increment consumption at Mesa Verde and the Weminuche Wilderness.
- Sources not yet in operation (including those for which complete applications have been submitted) were excluded from “hot spot” modeling. The reason is that the Division's primary goal is to determine if “existing” increments are being exceeded based on actual emission rates from existing facilities. Nevertheless, some permitted sources that are not yet operating have been included in the regional and long-range transport modeling.
- The actual emission estimates used in this study are primarily based on information in Air Pollution Emission Notices (APENs) and permit applications submitted by source operators to the Division. Some sources on Southern Ute Indian Tribe (SUIT) reservation do not file APENs with the Division and do not have permits issued by the Division. In fact, EPA has issued a number of PSD permits in the study area for sources on the SUIT reservation. For these sources, the Division has used unverified preliminary data obtained from the draft Environmental Impact Analysis (EIS) for oil/gas development on the reservation. Since the draft EIS was not available for review at the time this study was completed, the data used in this study may not be consistent with the final inventories in the SUIT draft EIS.
- For the reasons stated above, the reliability of this study is low for identifying hot spots around sources for which the Division does not issue permits.
- The actual emission estimates on APENs may not reflect the “actual” emissions from some sources. For example, some sources may report actual emissions based on manufacturer guarantees while stack testing shows “actual” emissions are much lower. In any case, the results in this study should tend to overestimate actual increment consumption.

- While the overall inventory for area and mobile sources has been spatially allocated across the entire modeling domain, a gridded inventory cannot be input into CALPUFF because it is not a numerical grid model. That is, specifying a grid of area or volume sources across the entire domain would cause excessive computing times. Thus, the area and mobile inventory was spatially allocated by GIS analysis into area sources as appropriate in those areas where the emission rates are significant. In other words, area and mobile source emissions were excluded from low emission density areas to conserve computing resources.
- The Division did not contact New Mexico to determine if there are any baseline sources that started operating after March 30, 1989 near the Colorado border. That is, according to the Division's interpretation of a recent EPA memo (see section 2.7), any sources in New Mexico that started operating after Colorado's minor source baseline date consume PSD increment at receptors in Colorado, even though the sources might not consume increment at receptors in New Mexico, where the minor source baseline date is in June 1989. It is unlikely this is a significant issue since the minor source baseline dates are so close.
- In areas near large point sources with apparent increment violations, EPA's regulatory modeling approach requires the use of conservative assumptions to account for the atmospheric conversion of NO to NO_2. For example, the default value for the Ambient Ratio Method assumes that 75% of NO is converted to NO_2. Various monitoring-based field studies and reviews of chemical/physical mechanisms suggest that an assumption of 75% conversion over estimates impacts significantly at fence-line receptors (i.e., at receptors within a few hundred meters of the stacks). While monitoring could provide useful information about NO_2 concentration levels in the atmosphere at a given point, it is often difficult to site a monitor at or near the location where the actual maxima from a point source occur. The recommended regulatory method (Ambient Ratio Method) of using monitoring to develop local conversion rates of NO to NO_2 are generally not valid in rural areas because there are too many clean days where the signal-to-noise ratios of the monitoring instruments do not allow reliable ratios to be computed. Thus, reliably estimating or monitoring the maximum NO_2 concentration near point sources is difficult at best.
- Increment expansion has not been modeled in this study, even though increment expanding emissions from area, mobile, and from some point sources exist.
- In this study, the Division has not determined the actual increment status of emissions from the Four Corners Power Plant. There may be rules, policies, or agreements in place that would affect how increment consumption or expansion would be determined at this particular facility. The Division contacted EPA to determine how to treat the emissions changes at the Four Corners Plant, but never received a clear determination about how to treat the emissions. Thus, in this study, the Division has assumed that changes in emissions at this facility do not consume or expand PSD increment. This assumption should be revisited the next time an increment analysis is done in this area. Refer to section 25 for a discussion about changes in emissions at the Four Corners Power Plant.

29.3. Comparison of Impacts to Class I Increments

The Class I nitrogen dioxide (NO_2) increment is 2.5 micrograms per cubic meter ($\mu g/m^3$) on an annual basis. The maximum receptor at Mesa Verde National Park (MVNP) has an annual

NOx concentration of 1.09 μg/m^3, according to the CALMET/CALPUFF modeling system.[34] The maximum receptor from CALMET/CALPUFF at the Weminuche Wilderness Area (Weminuche) has an annual NOx concentration of 0.51 μg/m^3. Therefore, modeled concentration estimates at both Mesa Verde National Monument and at the Weminuche Wilderness Area are well below the Class I NO_2 increment. In addition, due to the magnitude of the impacts at the Class I areas, it's clear that no major source in Colorado consumes more than 75 percent of the increment at MVNP or Weminuche.[35]

ISCST3 modeling was also performed for each Class I area, but the Division concluded that CALMET/CALPUFF is the more appropriate model to use. The ISCST3 results suggest that PSD Class I increments are not currently violated at the Weminuche Wilderness Area. The ISCST3 results are less clear for Mesa Verde National Park. One ISCST3 modeling analysis at Mesa Verde showed maximum nitrogen oxides (NOx) impacts of 2.61 μg/m^3. While this is slightly above the Class I increment of 2.5 μg/m^3 for NO_2, the estimate is based on the conservative assumption that all NO is converted to NO_2. Another ISC3 analysis using a different meteorological data set shows a maximum NOx impact of just over 1.64 μg/m^3. Not surprisingly for a steady-state model where the wind field is uniform spatially for each hour, the ISC3 results vary significantly with the meteorological data used. For the Class I analysis, there is not a single "correct" meteorological data set to use in a steady-state Gaussian model like ISC3 when over 700 point sources are being modeled. In fact, the Class I results from the ISCST3 model contain significant uncertainties and probably significantly overestimate impacts at Mesa Verde. Therefore, due to transport distances and complex terrain meteorology, the CALMET/CALPUFF model, which uses spatially varying meteorology, is the most appropriate model for estimating Class I impacts in this case.

[34] In the CALMET/CALPUFF modeling, no atmospheric conversion of NO to NO_2 has been assumed; that is, it has been assumed that all NOx emitted exists as NO_2. In addition, it has been assumed there is no deposition.

[35] Regulation No. 3, Part B, § VII.A.5.a states that new sources and modifications shall consume no more than 75% of an applicable increment.

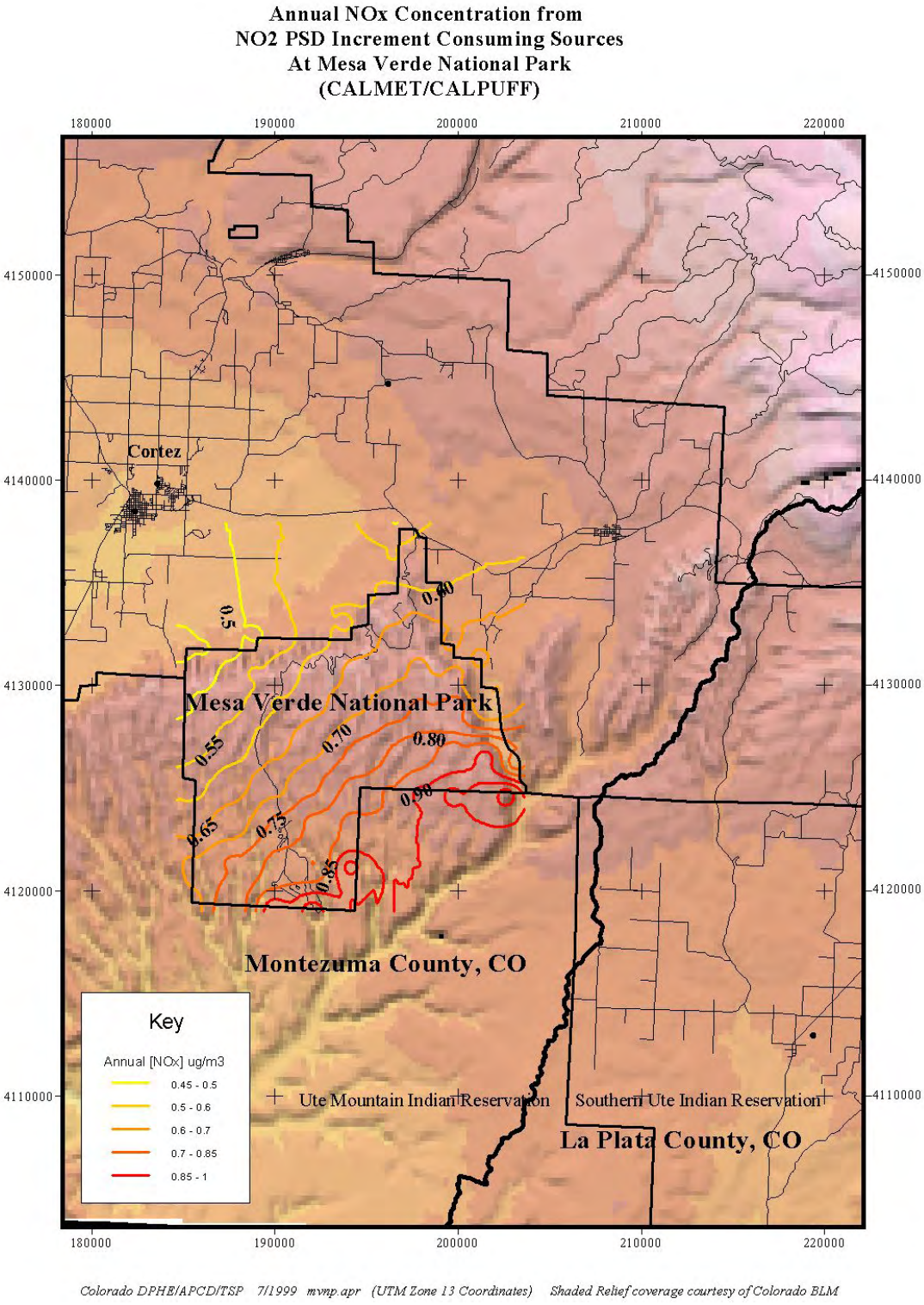


Figure 58. Estimated existing Class I NO_2 increment consumption in Mesa Verde National Park, based on CALMET/CALPUFF modeling.

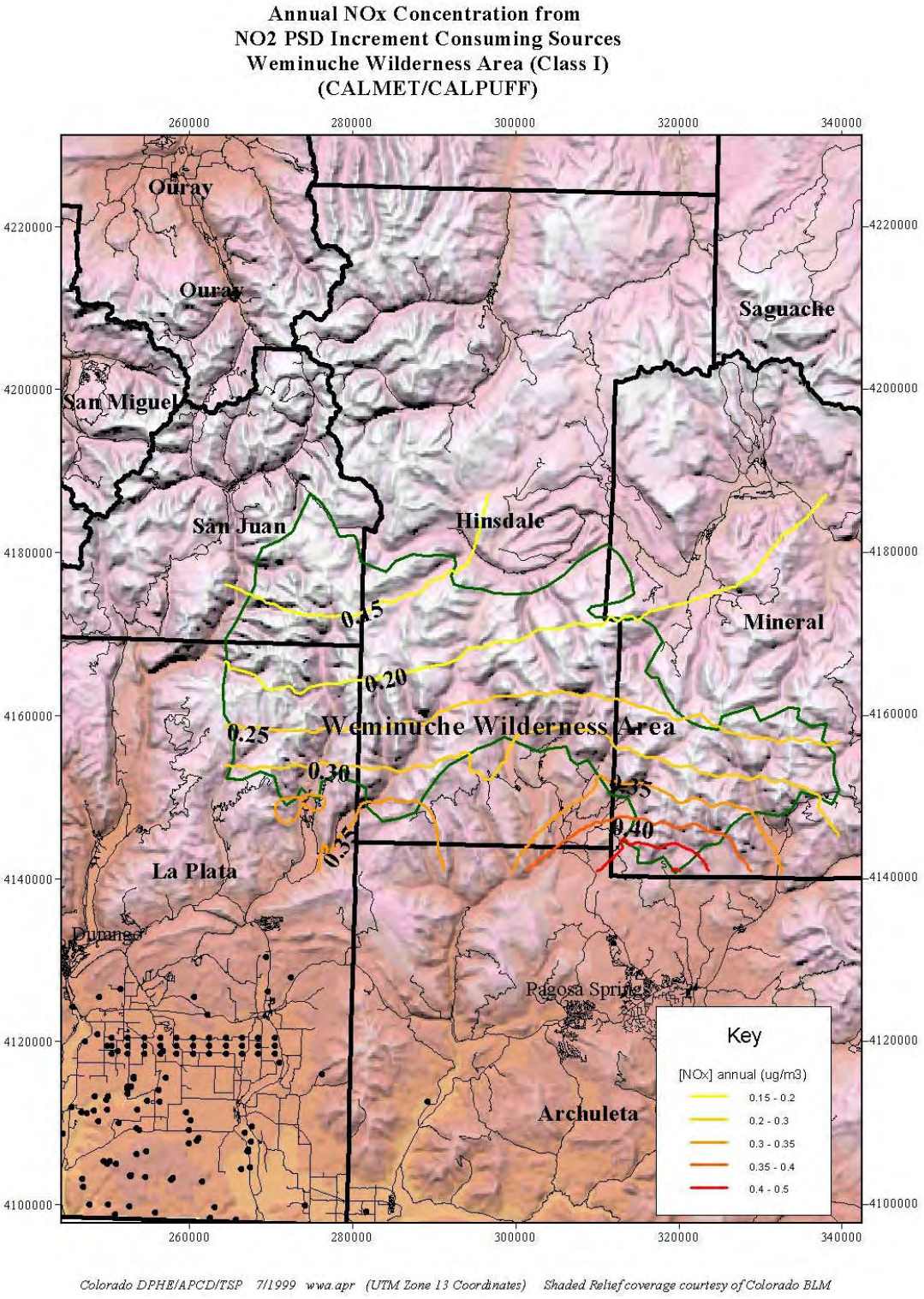


Figure 59. Estimated existing Class I NO_2 increment consumption in the Weminuche Wilderness Area, according to CALMET/CALPUFF modeling.

29.4. Comparison of Impacts to Class II Increments

Model concentration estimates have been compared to Class II increments in geographic areas that are not designated as Class I. The Class II nitrogen dioxide increment is 25 micrograms per cubic meter on an annual basis.

The Division checked to see if any individual major sources in the Colorado portion of the domain consume more than 75 percent of the PSD increment. The only apparent violation is near the PLA-9 facility; but further study is required before this can be determined with certainty.

The Division focused its hot spot modeling efforts on existing sources that emit more than 100 tons per year of actual emissions. The Division restricted receptor placement to Colorado except for the work done near the Williams Field Services PLA-9 facility which is within a few hundred meters of the New Mexico border.

As shown in the figure on the following page, ISCST3 modeling suggests that the Class II PSD increments in the Colorado portion of the study area are not being violated over broad geographic areas. In most areas, about 4 to 8 $\mu g/m^3$ of the Class II increment of 25 $\mu g/m^3$ has been consumed, assuming 75 percent of all emitted NOx exists as NO_2. Areas with modeled estimates over 15 $\mu g/m^3$ are isolated and restricted to small geographic areas immediately adjacent to large NOx sources. Given the inherent and reducible uncertainties in the emissions and dispersion modeling system, the ISCST3 estimates are probably on the high side.

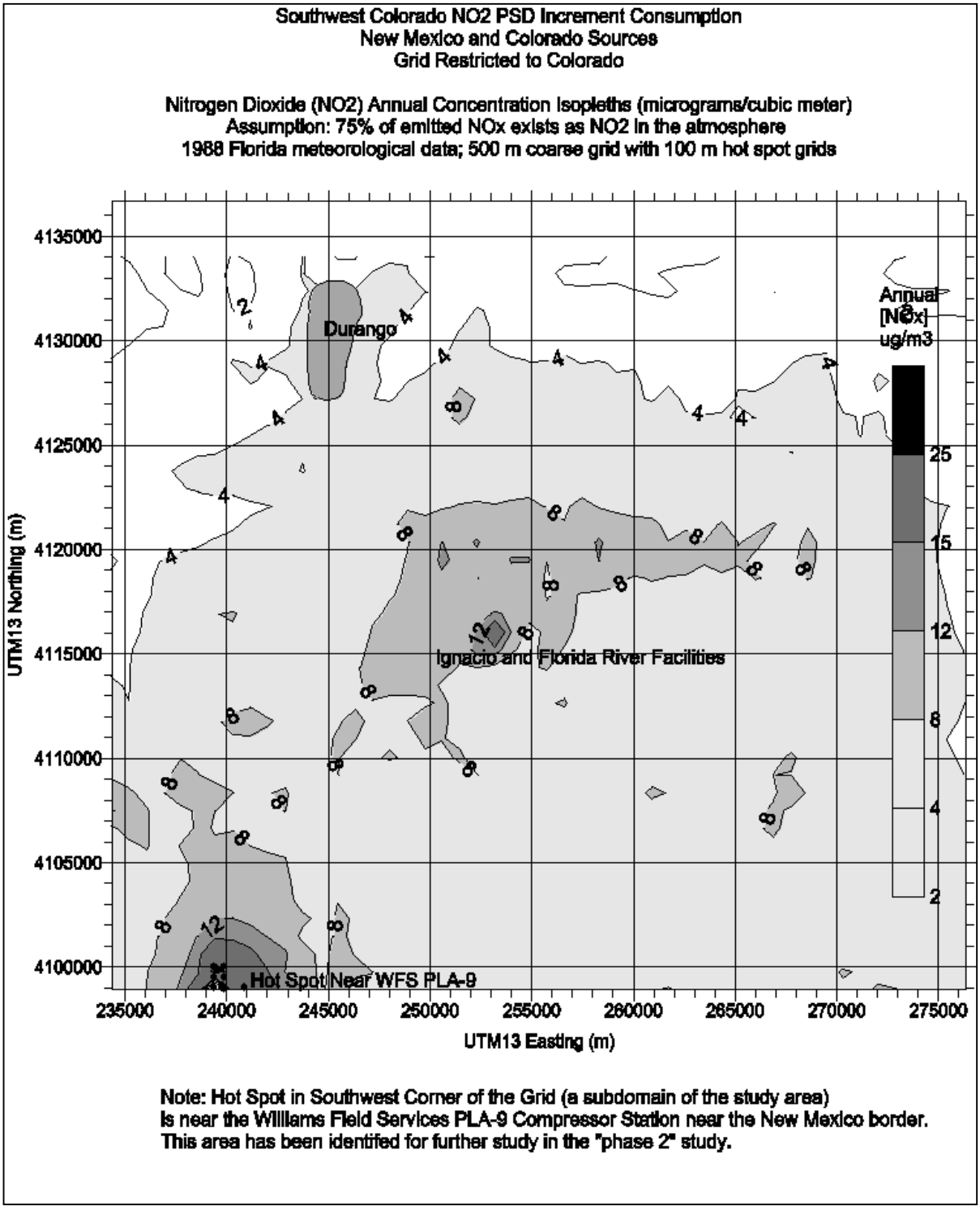


Figure 60. Estimated annual NO_2 concentration levels from increment consuming sources. All areas shown are Class II.

29.4.1. Estimated Increment Consumption in Durango and Cortez

The nitrogen oxides emissions inventory suggests that NOx emissions have increased from area and mobile sources in Durango and Cortez since 1989. That is, the population and Vehicle Miles Traveled (VMT) growth have overwhelmed the effects of fleet turnover with cleaner engines. In Durango, NOx emissions have increased by about 120 tons per year since 1989. In Cortez, which is near Mesa Verde, NOx emissions have increased by about 40 tons per year. These increases are increment consuming.

The change in NOx emissions on a grid-cell by grid-cell basis for area/mobile sources in Durango and Cortez are shown in Figure 4 and 5 (see Section 3.2 of this report).

ISCST3 modeling suggests that the Class II NO_2 increment in Cortez and Durango is not in jeopardy. While significant growth in NOx emissions has occurred, PSD increments are not threatened at this time. In Durango, it is estimated that up to 10 $\mu g/m^3$ of the Class II increment of 25 $\mu g/m^3$ has been consumed; that is, up to 40% of the available increment has been consumed. It should be emphasized that the modeling approach used probably tends to overestimate actual increment consumption.

Increment consuming emission from area and mobile sources in Cortez and other communities in the Colorado portion of the study area are significantly less than changes in Durango. When compared to Durango, NOx emissions density is much lower in the vicinity of Cortez and other towns in the Colorado portion of the study area. Thus, regional modeling results suggest that increment consumption in smaller communities in the study area is less than 6 $\mu g/m^3$. Nevertheless, because of the close proximity of Cortez to Mesa Verde NP, the Division has quantified the Class I increment consumption from area and mobile sources in Cortez on Mesa Verde NP.

Area and mobile NOx emissions in Cortez have a negligible impact on Mesa Verde National Park (i.e., less than 1% of increment consumption at Mesa Verde is from emissions from Cortez). ISCST3 modeling suggests that increment-consuming emissions from Cortez have consumed only about of 0.02 $\mu g/m^3$ of the Class I increment of 2.5 $\mu g/m^3$. Thus, most of the area-wide increment consumption in Mesa Verde appears to be from more distant stationary sources.

NOx emissions in Durango have a small impact on Weminuche Wilderness Area. ISCST3 modeling suggests that increment consuming emissions from area and mobile sources in Durango have consumed only about 0.06 $\mu g/m^3$ of the Class I increment of 2.5 $\mu g/m^3$. Thus, most of the area-wide increment consumption in the Weminuche Wilderness Area appears to be from stationary sources.

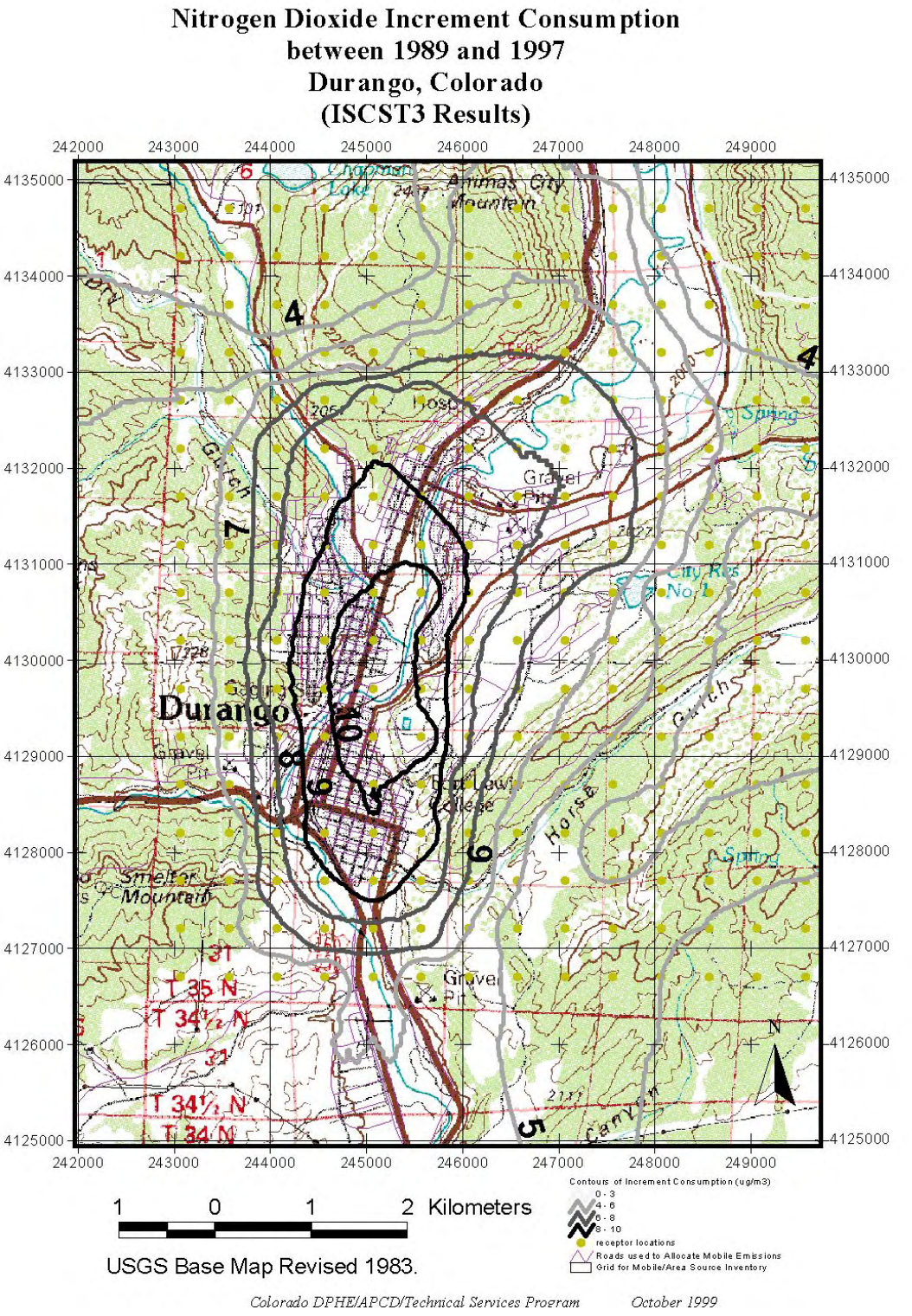


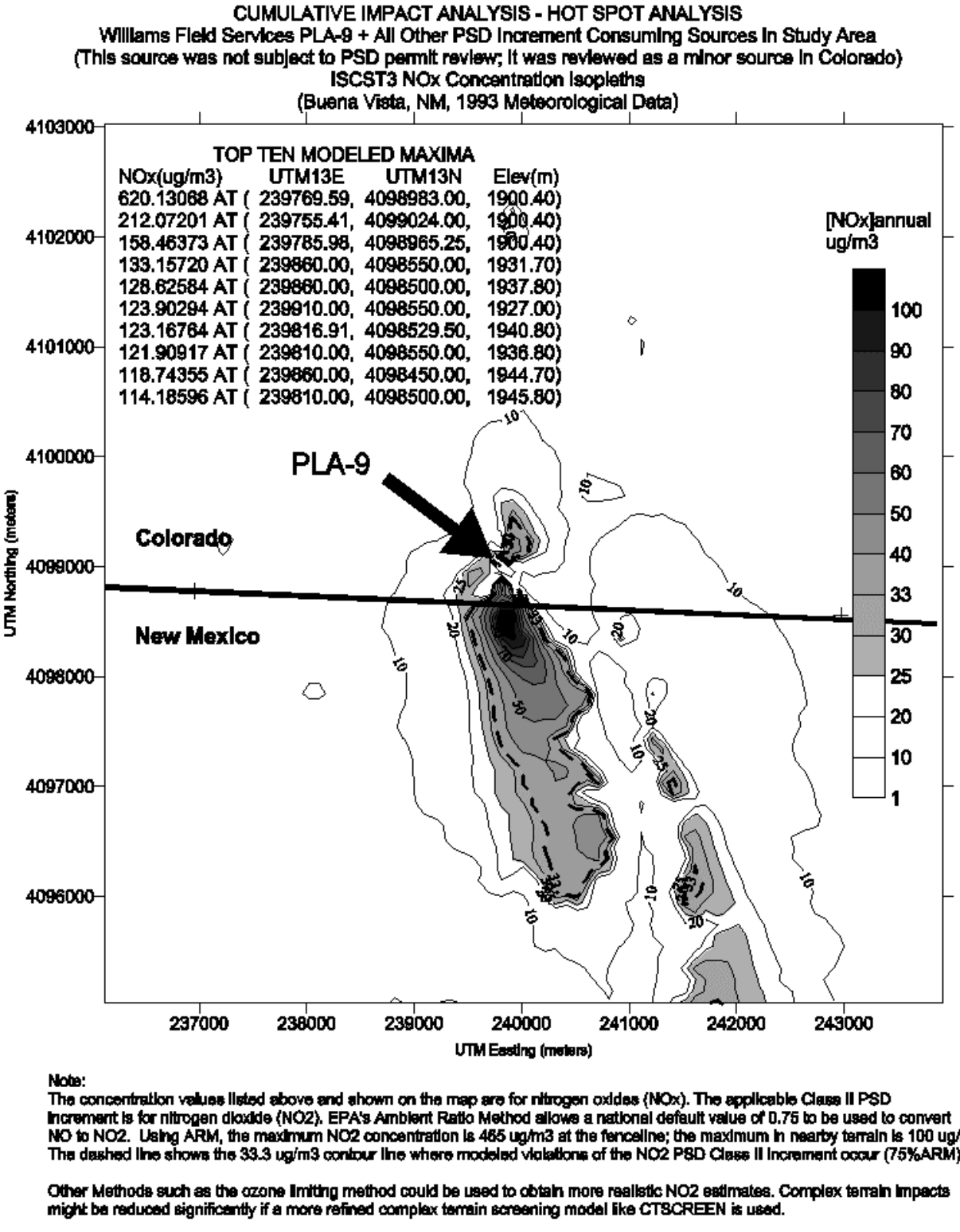
Figure 61. NO_2 increment consumption in Durango. About 40 percent of the Class II increment has been consumed, according to ISCST3 modeling.

29.4.2. Hot Spots near Stationary Sources

ISC3 results suggest that there is one isolated hot spot in La Plata County where there may be existing Class II PSD increment violations. A second hot spot in the vicinity of the Ignacio and Florida River facilities has modeled impacts below the Class II increments. Maps showing concentration isopleths near each of these hot spots are shown in the next few pages.

The Division has worked closely with Williams Field Services to perform quality assurance checks of the Division's modeling. Based on modeling done to date, this modeled violation may or may not actually exist. Further study is required. The issues include apparent fenceline violations within tens of meters of engines where the annual NOx impact from ISC3 is as high as 600 micrograms per cubic meter. It's believed that most of this problem is due to building downwash from one particular engine with a short stack. In addition to the fence line issues, there are complex terrain impacts over 100 $\mu g/m^3$ of NOx within a kilometer of the facility. The apparent increment violations from PLA-9 extend well into New Mexico. It should be noted that the complex terrain impacts cited here are from the ISCST3 model, which contains a conservative "screening" algorithm for estimating impacts in complex terrain. It's likely that impacts would be significantly lower if a more refined screening-level model like CTSCREEN is used. In addition, since the source plumes are close together, it may be possible to use the combined-plume ozone-limiting method to get more realistic estimates of NO to NO_2 conversion rates.

It's also important to realize that the PLA-9 modeling, and all other stationary source modeling in this study, is primarily based on actual emissions as reported on Air Pollution Emission Notices. In a situation like this where apparent "existing" increment violations are found, one of the steps in the refined phase 2 study will be to review emission factors. In many cases, particularly for newer engines, the actual emission rates can be significantly lower than emission rates reported on APENs. Thus, emission factor assumptions will also be addressed in the phase 2 study.



Note:
The concentration values listed above and shown on the map are for nitrogen oxides (NOx). The applicable Class II PSD increment is for nitrogen dioxide (NO2). EPA's Ambient Ratio Method allows a national default value of 0.75 to be used to convert NO to NO2. Using ARM, the maximum NO2 concentration is 465 ug/m3 at the fenceline; the maximum in nearby terrain is 100 ug/m3. The dashed line shows the 33.3 ug/m3 contour line where modeled violations of the NO2 PSD Class II increment occur (75%ARM).

Other Methods such as the ozone limiting method could be used to obtain more realistic NO2 estimates. Complex terrain impacts might be reduced significantly if a more refined complex terrain screening model like CTSCREEN is used.

Figure 62. NO_2 increment consumption estimates from ISCST3 near the WFS PLA-9 facility. Note that the isopleths shown here are for NOx, not NO_2.

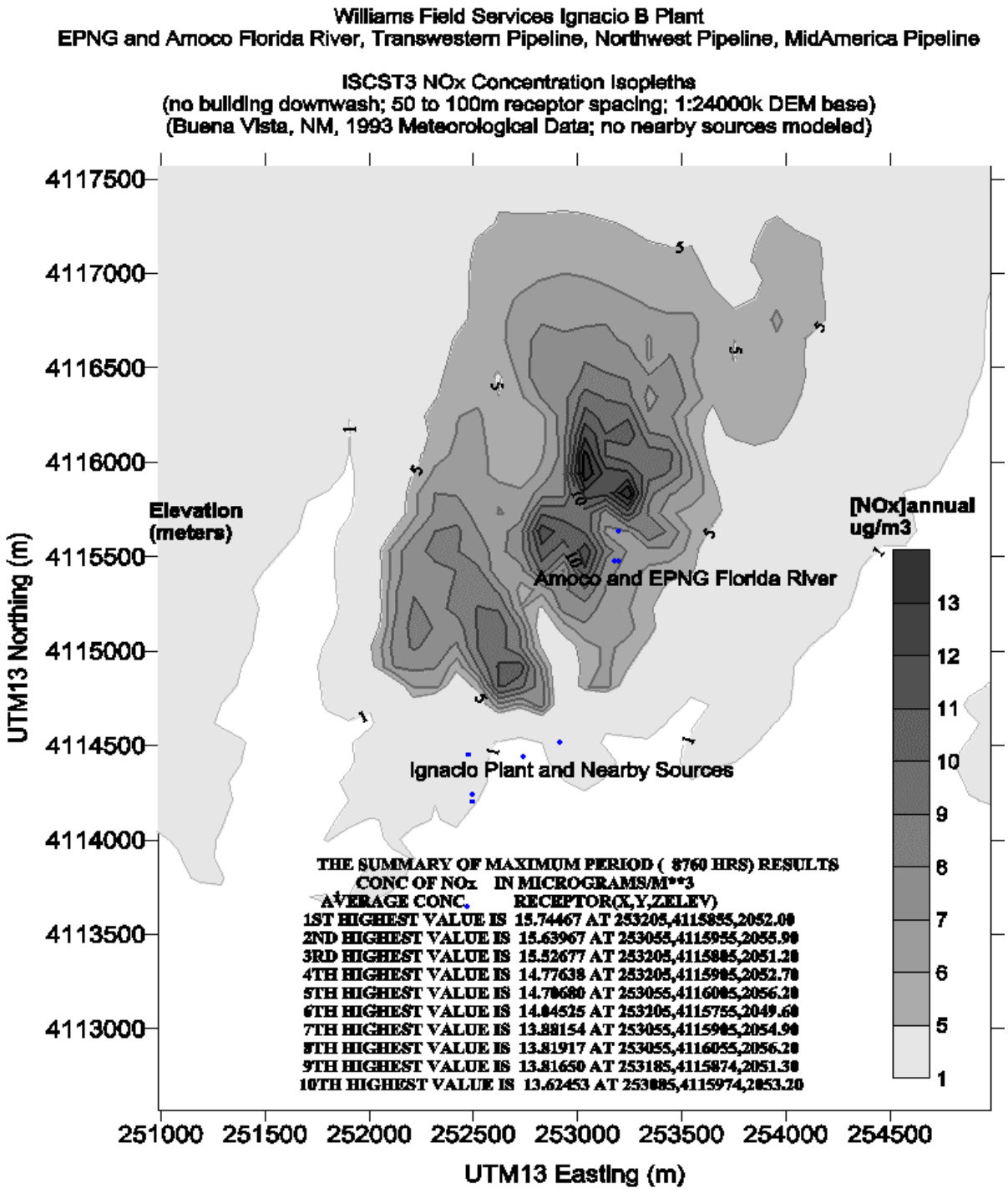


Figure 63. NO_2 increment consumption near the WFS Ignacio B plant and the Amoco/EPNG Florida River facilities. Note that the isopleths are for NOx, not NO_2.

29.5. Conclusions

The study area is identical to the one used for the Southern Ute Indian Tribe draft Environmental Impact Statement (EIS) which was not yet finished at the time this study was done. The study area is 176 by 176 kilometers and is almost equally split between New Mexico and Colorado. Most of the point sources in the study area are in La Plata County, Colorado and San Juan County, New Mexico.

The level of precision of results in this report is not intended to imply a level of accuracy.

The estimated NOx emission rate from area and mobile sources used in this study is 9,024 tons/year in the study area. It is based on 1997 data. This compares to a total of 8,860 tons per year in 1989. Thus, overall area and mobile source emissions have increased by about 164 tons per year in the study area. Emissions from area sources account for the increase. Mobile source emissions from highway and non-road sources in the study area have decreased by about 86 tons per year since 1989. Since the increase in area and mobile sources is relatively small or negative in most grid cells, area and mobile source emissions have been included in the dispersion modeling for only those few grid cells where there has been a significant increase in emissions since 1989. In particular, NOx area/mobile source emissions were modeled for Durango and Cortez. In Durango, area/mobile emissions increased by up to 32 tons per year in the 2-kilometer by 2-kilometer grid cells used in the modeling.

As of 1999, the total actual NOx emission rate from stationary sources in the Colorado portion of the study area is estimated to be about 7,190 tons per year. This compares to a baseline year (1989) estimate of 2,208 tons per year. Thus, increment-consuming emissions are estimated to be about 5,000 tons per year from Colorado point sources in the study area. In contrast, the New Mexico inventory for the study estimates increment-consuming emissions at about 23,500 tons per year. Thus, for the entire study area, increment-consuming point sources emit about 28,700 tons per year.

ISC3 modeling has been performed for both near-field and far-field receptors, but only the results at near-field receptors in Class II areas are recommended for use in decision-making for this study. The reason is that ISC3 is a steady-state Gaussian plume model that is not recommended for long-range transport modeling (i.e., source-to-receptor distances greater than 50 km). CALMET/CALPUFF is the recommended long-range transport model. It is a non-steady-state puff model that is well suited for the complex terrain and meteorology in this study area.

The focus of the ISC3 modeling is on the near-field areas less than 50 kilometers from sources of interest. The primary area of concern for Class II increments in the Colorado portion of the study area is La Plata County. Most of the sources in this relatively high emissions density area are contained within a 50-kilometer circle. Thus, ISC3 is the appropriate model to use for all of the Class II increment modeling, according to Appendix W of 40 CFR Part 51 (Guideline on Air Quality Models). Since some Class I receptors are less than 50 km from a given source, both ISCST3 and CALMET/CALPUFF have been used

for the Class I modeling. Nevertheless, as discussed later, the Division believes that CALMET/CALPUFF provides the most reliable results for Class I receptors.

The Class I nitrogen dioxide (NO_2) increment is 2.5 micrograms per cubic meter ($\mu g/m^3$) on an annual basis. The maximum receptor at Mesa Verde National Park (MVNP) has an annual NOx concentration of 1.09 $\mu g/m^3$, according to the CALMET/CALPUFF modeling system.[36] The maximum receptor from CALMET/CALPUFF at the Weminuche Wilderness Area (Weminuche) has an annual NOx concentration of 0.51 $\mu g/m^3$. Therefore, modeled concentration estimates at both Mesa Verde National Monument and at the Weminuche Wilderness Area are well below the Class I NO_2 increment. In addition, due to the magnitude of the impacts at the Class I areas, it's clear that no major source in Colorado consumes more than 75 percent of the increment at MVNP or Weminuche.[37]

In general, the modeling suggests that the Class II PSD increments in the Colorado portion of the study area are not being violated over broad geographic areas. In most areas, about 4 to 8 $\mu g/m^3$ of the Class II increment of 25 $\mu g/m^3$ has been consumed, assuming 75 percent of all emitted NOx exists as NO_2. Areas with modeled estimates over 15 $\mu g/m^3$ are isolated and restricted to small geographic areas immediately adjacent to large NOx sources. Given the inherent and reducible uncertainties in the emissions and dispersion modeling system, the ISCST3 estimates are probably on the high side.

Annual NO_2 concentrations between 1991 and 1996 at the Ignacio monitoring station vary from about 9 to 15 $\mu g/m^3$. Model performance measures with respect to the monitored ambient data were not calculated since the inventory in the model is for increment consuming emissions as opposed to total NOx emissions. In any case, a cursory comparison of the monitored values with the "regional" modeled increment consumption suggests the modeling results are in a reasonable range. The monitoring data also demonstrate that the existing ambient NO_2 concentration levels at the monitoring station are well below the NO_2 Class II increment. This provides further evidence that increments are not being violated regionally.

ISC3 results suggest that there is one isolated hot spot in La Plata County where there may be existing Class II PSD increment violations. Thus, the Division has worked closely with the source operator to perform quality assurance checks of the Division's modeling. Based on modeling done to date, this modeled violation may or may not actually exist. Further study is required.

[36] In the CALMET/CALPUFF modeling, no atmospheric conversion of NO to NO_2 has been assumed; that is, it has been assumed that all NOx emitted exists as NO_2. In addition, it has been assumed there is no deposition.
[37] Regulation No. 3, Part B, § VII.A.5.a states that new sources and modifications shall consume no more than 75% of an applicable increment.

29.6. Recommendations

Based on the results of this "phase I study," the following actions are recommended:

- It is recommended that a "phase II" study be done in the area around the Williams Field Services (WFS) PLA-9 facility. The intent of the "phase II" study is to resolve source-specific increment issues.
- WFS has agreed to voluntarily perform the "phase II" study as part of their efforts to perform modeling for a proposed major modification at PLA-9. The phase II report with a refined modeling analysis should be submitted by WFS to the Division for review. The Division will complete the study if WFS does not complete it.
- If the apparent increment violations can be resolved through the "phase II" refined analysis, a copy of the report and the Division's review comments will be sent to the Commission as a follow-up to the phase I study.
- If increment violations exist in the "phase II" refined analyses, the procedures set forth in Regulation No. 3, Part B, Section VII may be triggered. Nevertheless, case specific issues would need to be reviewed before making such a decision. For example, a permit application for a modification at PLA-9 is expected in late 1999 or early 2000. If the modification is major for nitrogen dioxide, regulations require that compliance with the PSD NO_2 increments be demonstrated before the permit can be issued. Thus, it is possible that the increment issues surrounding PLA-9 will be resolved through the permitting process.

30. Data Access

Data files are available from the Division upon request. Check the Technical Services Program's Internet site (http://apcd.state.co.us) for information on this and related reports.

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