December 15, 1989

Mr. Thomas Diggs
Chief, SIP/New Source Review Section, 6TAN
U.S. Environmental Protection Agency
Region VI
1445 Ross Avenue
Dallas, TX 75202

Mr. Eric Ginsburg
Chief, Sulfur Dioxide Programs Section
EPA Office of Air Quality Planning and
Standards (MD-15)
Research Triangle Park, NC 27711

Dear Messrs. Diggs and Ginsburg:

Re: ALTERNATIVE EMISSION REDUCTION (BUBBLE) SIP REVISION AUTHORIZING OPERATION OF A NEW SULFUR RECOVERY PLANT AT THE CONOCO INC. PONCA CITY REFINERY

I. Introduction

Over the past several weeks, Conoco and EPA representatives have been discussing the nature and extent of dispersion modeling required for EPA's approval of the referenced bubble as a revision to the Oklahoma SIP. As you know, appropriate state permits and approvals have been secured for the project, including a new cogeneration system construction permit and an alternative emissions control permit authorizing construction of a new sulfur recovery unit (SRU) having a sulfur removal efficiency of 94.5%, somewhat lower than that required by the Oklahoma SIP. The incrementally higher SO_2 emissions resulting from this SIP relaxation have been offset by a factor of more than 2:1 due to project-related boiler curtailments and project-related conversions of certain units to sweet refinery fuel gas.

Numerous EPA concerns relative to the approval of this SIP revision have already been addressed by Conoco, including:

- Elimination of any possibility that offset credit would be taken for emission reductions required by the 1987 NSPS Consent Decree.

- Justification of project emissions factors.

- Resolution of NSPS applicability questions for the new turbines.

- Elimination of any possibility that upset releases could be automatically insulated from state enforcement action.

- Assurance that continuous emissions monitoring will be used for the sulfur plant if the material balance method proves unreliable.

The only matter still unresolved concerns the required demonstration of ambient equivalence. Once this issue is resolved, it should be possible for EPA to complete its evaluation and approve the SIP revision in an expeditious fashion. This prompt approval is crucial if the sulfur plant is to meet its January, 1990 startup schedule. Of even greater importance, prompt EPA approval will enable Conoco to begin implementing substantial SO_2 emissions reductions from its Ponca City refinery.

II. <u>Modeling Procedure</u>

Level II sequential dispersion modeling of the Ponca City Refinery bubble trade SO_2 emissions was conducted with the EPA ISCST model, using modeling procedures consistent with EPA modeling guidelines and the December 1986 EPA Emission Trading Policy Statement. The meteorological inputs for the modeling consisted of a 1978 hourly sequential preprocessed meteorological data set, produced with Ponca City, Oklahoma surface observations and Oklahoma City, Oklahoma twice-daily mixing depths. This data set is the most recent meteorological data available that is representative of the Ponca City Refinery site. Rural dispersion coefficients and regulatory default model features were used. None of the sources to be modeled meets the requisite Schulman-Scire criteria for directional downwash inputs.

Attachment 1 shows the locations of the SO_2 sources considered in the Level II analysis. The SO_2 emissions modeled consisted of (1) pre-project actual emissions from sources that are involved in the emissions trade, and (2) post-project allowable emissions from the sources that are involved in the emissions trade, including the SRU at 94.5 percent control.[1]

At the specific direction of EPA Region VI staff, the maximum net concentration at each modeling receptor for the annual, 24-hour, and 3-hour averaging periods was determined by assuming contemporaneous negative and positive emissions from pre- and post-project sources, respectively.

A total of 690 receptors were used in the modeling. Attachment 2 shows the large-scale receptor distribution and Attachment 3 shows the distribution of the 100- and 200-meter spaced receptors. Receptors were located along the refinery fenceline, with 100-meter spacing on the eastern fenceline and 200-meter spacing on the western fenceline. In addition, 100-meter spaced grid receptors were placed outside the fenceline in all locations within one kilometer of the SRU. A grid of 500-meter spaced receptors extended at least 4 kilometers in every direction from the SRU.

III. <u>Modeling Results</u>

The maximum annual, 24-hour, and 3-hour SO_2 net concentrations were predicted for each receptor and compared with the Level II SO_2 significance concentrations of 3, 13 and 46 ug/m^3, respectively. The maximum annual average concentration was below the significance level at all receptors, and below zero (indicating air quality improvement) at most receptors. As Attachments 4 and 5 show, the maximum predicted 24-hour and 3-hour concentrations were slightly above the respective significance levels in limited areas to the east of the refinery.

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[1]It should be noted that this modeling analysis includes pre- and post-project emissions from one heater (H-5003) which were not included in the state permit which approved Conoco's bubble application. A technical correction is being sought to ensure the federal enforceability of the project-related SO_2 emissions reductions that will result from the conversion of this unit from sour to sweet refinery fuel gas.

Examination of the model output shows that predicted exceedances of the Level II significance levels are very few in number. Of the 3,285 averaging period involved (i.e., 2920 3-hour periods and 365 24-hour periods), exceedances of the Level II values occurred during only fifteen periods (twelve three-hour periods and three 24-hour periods). At all other

receptors, the maximum 24-hour and 3-hour net concentration was either negative or below the significance level.

Further, those few exceedances of the Level II values which are predicted are quite modest in magnitude. This is clearly illustrated by Table 1, listing the top two 24-hour and the top three 3-hour modeled concentrations at the maximum-impact receptors within the areas where the Level II significance values were exceeded:

Table 1

	Modeled Net Concentration Increase ug/m^3 at Receptor Indicated on Attachment 4 (Significance Level 13)	Modeled Net Concentration Increase ug/m^3 at Receptor Indicated on Attachment 5 (Significance Level 46)
Highest 24-hour	17.7	--
Second-highest 24-hour	12.9	--
Highest 3-hour	--	76.0
Second-highest 3-hour	--	50.9
Third-highest 3-hour	--	41.2

Table 1 shows that only one exceedance of the 24-hour Level II significance level (13 ug/m^3) was observed at the maximum-impact receptor and only two exceedances are predicted for the three-hour significance value (46 ug/m^3).

As mentioned above, the modeling showed "negative" concentrations (indicating an improvement in pre-project air quality) far more frequently than positive concentrations.

This was even seen to be the case at the receptors in the significant impact areas depicted on Attachments 4 and 5. The distribution of concentrations at the maximum-impact receptors is summarized in the following Table 2:

Table 2

	24-hour Concentration Changes at Receptor Indicated on Attachment 4	3-hour Concentration Changes at Receptor Indicated on Attachment 5
Number of Negative Concentrations	114	270 (approximate)
Number of Positive Concentrations	40	100 (approximate)
Number of Zero Concentrations	211	2550 (approximate)
"Largest Negative" Concentration (i.e., Largest Air Quality Improvement)	35.0 ug/m^3	96.0 ug/m^3
Largest Positive Concentration	17.7 ug/m^3	76.0 ug/m^3
Annual-Average Impact of Trade	-1.0 ug/m^3	-1.6 ug/m^3

As is seen in Table 2, incidents of air quality improvement are not only more frequent than incidents of positive concentrations, even within the trade's significant impact area, but the maximum air quality improvements are also greater in magnitude than are the maximum significant impacts.

Conoco believes that the results of Level II modeling clearly demonstrate that the sources involved in the bubble trade will provide a substantial net improvement in SO_2 air quality in the region. Hence, the only logical purpose that could be served by Level III modeling would be to provide assurance that the proposed bubble will not cause or contribute to an NAAQS exceedance in the areas which show modeled exceedances of the Level II significance values. To that end, Conoco believes that a careful analysis of the Level II model results, when viewed in context with the physical configuration of existing SO_2 sources at the Ponca City Refinery (and other sources in the area), leaves little doubt that no such threat exists in these areas.

Attachment 6 presents the locations of all current and proposed SO_2 sources at the Ponca City Refinery. The dots represent existing sources and the triangles represent proposed sources. As Attachment 6 shows, the vast majority of the refinery's SO_2 sources are in the northern half of the refinery, from one-half to one and one-half kilometers to the north of the SRU location. Also, the existing sources are distributed along a north-south axis. Because of this source distribution, predicted concentrations would generally be expected to be relatively low to the east of the refinery because the maximum impacts from the individual sources, distributed fairly evenly in a north-south direction, could not be expected to overlay in such a manner so as to produce high concentrations to the east of the refinery during a 24-hour or 3-hour averaging period.

Even if it were postulated that existing refinery sources could cause high concentrations towards the east, it is extremely unlikely that the SRU could contribute significantly to these concentrations. As is seen on Attachments 7 and 8, the configuration of refinery sources is such that west-northwest or northwest winds would be necessary in order for existing refinery sources to substantially contribute to 24-hour or 3-hour concentrations in the areas where Level II modeling has shown predicted exceedances of the Level II significance thresholds. <u>The proposed SRU is to the southwest of these areas</u>. It would be extremely unlikely that the SRU could contribute significantly to SO_2 concentrations in these same areas during meteorological conditions in which a west-northwest or northwest wind is a determining factor.

An illustration of this conclusion can be derived from a review of meteorological conditions for the periods when the Level II significance values were exceeded at the two maximum-impact receptors depicted on Attachments 4 and 5. During all three of these modeled events, meteorological conditions rule out any appreciable contribution from existing refinery sources.

In addition, the only other SO_2 sources in the region are a carbon black plant several miles to the south of the refinery and a power plant about 15 miles south of the refinery. Because of their distance and direction from the refinery, neither of these facilities could be expected to cause high 24-hour or 3-hour concentrations in the Level II significance areas during periods of significant impact from the trade (i.e., during periods of winds from the west-southwest).

The December 1986 EPA Emissions Trading Policy Statement states that "a geographically limited Level III analysis may be used in some cases where a Level II analysis predicts one or more exceedances of the Level II significance values." Level III modeling is not, however, the only tool that may be employed where the Level II analysis yields such predictions. As noted in the Sheldon Meyers memorandum of February 17, 1989, "other techniques may be approved where they can be demonstrated to be equally protective of the standards and PSD increments" (51 FR 43856, December 4, 1986).

Conoco believes that the methodology presented in this letter satisfies the basic intent of the Meyers memorandum by demonstrating the absence any realistic threat to the ambient standards. The fundamental purposes of moving to a Level III analysis are to (1) assure the overall ambient equivalence of the trade and (2) to ensure that the trade will not cause or contribute to ambient air quality violations. In this case, as shown in Table 1, Level II modeling and sound professional judgment clearly show that air quality will improve substantially at all modeled receptors as a result of the trade. (Out of 2,266,650 model output values, only an estimated 88 show an exceedance of the Level II significance values. The overwhelming majority of model output values show improved air quality as a result of the proposed bubble.) Further, the spatial configuration of SO_2 sources at the Ponca City Refinery and other area sources leaves little doubt that these few predicted exceedances of the Level II significance values could not reasonably be suspected of causing or contributing to violations of ambient standards. Analysis of the meteorological data shows it to be extremely unlikely that existing sources would be contributing to any appreciable degree during the few localized episodes of significant impact from the trade.

In this particular situation, the case by case methodology called for by EPA's Emissions Trading Policy (See 51 FR 43845) leads Conoco to the conclusion that a Level III modeling analysis would not be productive and is not required as a condition to EPA's approval of a SIP revision which all parties, including EPA, have described as clearly beneficial for air quality in Ponca City.

Construction of the new sulfur plant to be authorized through this SIP revision has been completed in accordance with a proper state construction permit and will be ready to startup in early January. Operation of this vital new unit will enable Conoco to recover up to 20 long tons per day of sulfur from refinery fuel gas -- sulfur which would otherwise be converted to 40 tons per day of sulfur dioxide emissions. Level III modeling will cost tens of thousands of dollars, will take several man-weeks to complete and would substantially delay the planned startup of the unit. The dubious value of Level III modeling in this case does not appear to justify these costs and delays.

Sincerely,

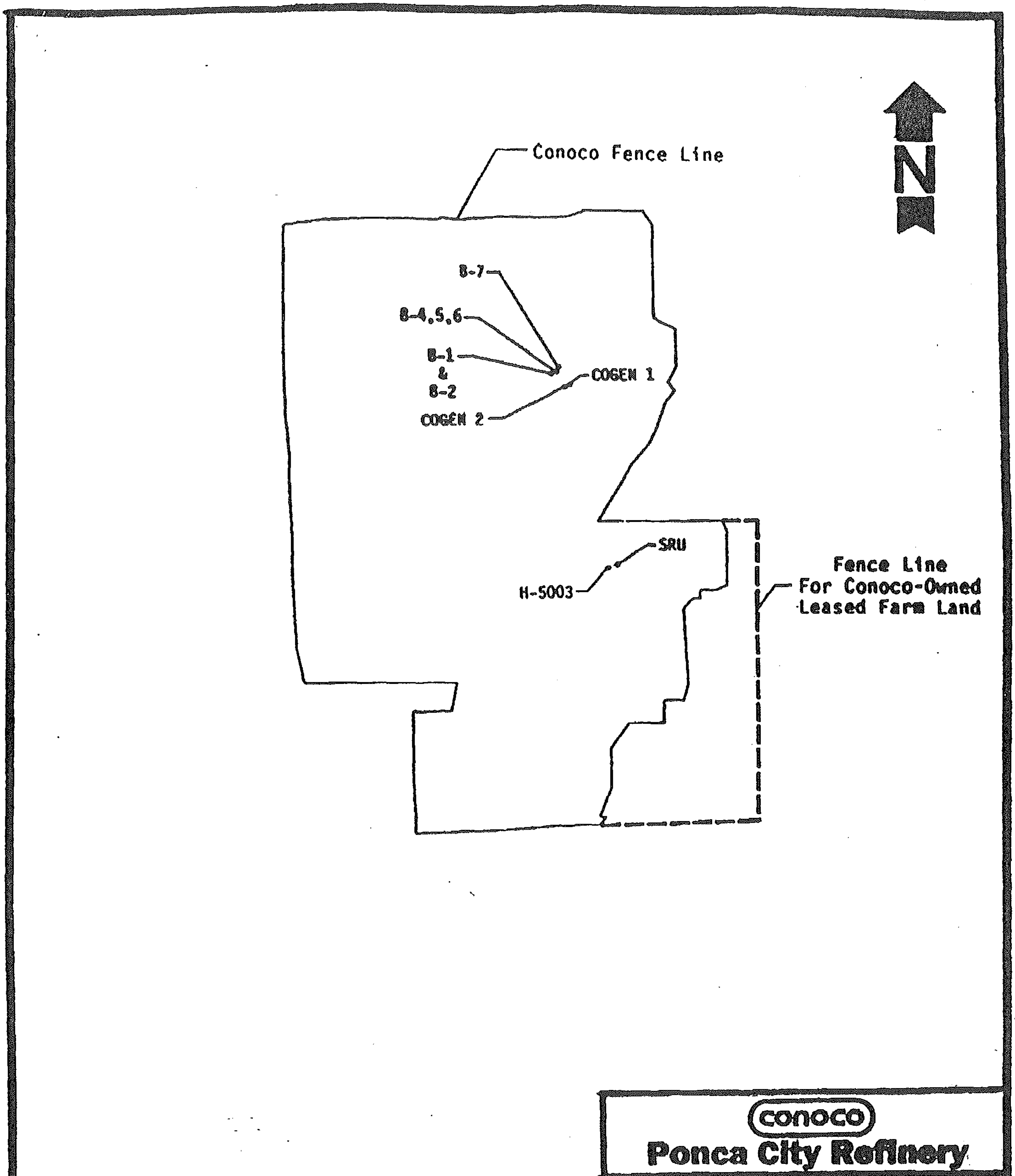
Bill Bridwell (GKR)

Bill Bridwell
Chief Engineer, Environmental Division
Ponca City Refinery
Conoco Inc.

/dp

Attachments

Dean



Attachment 1

Location of Modeled Sources

12/13/89

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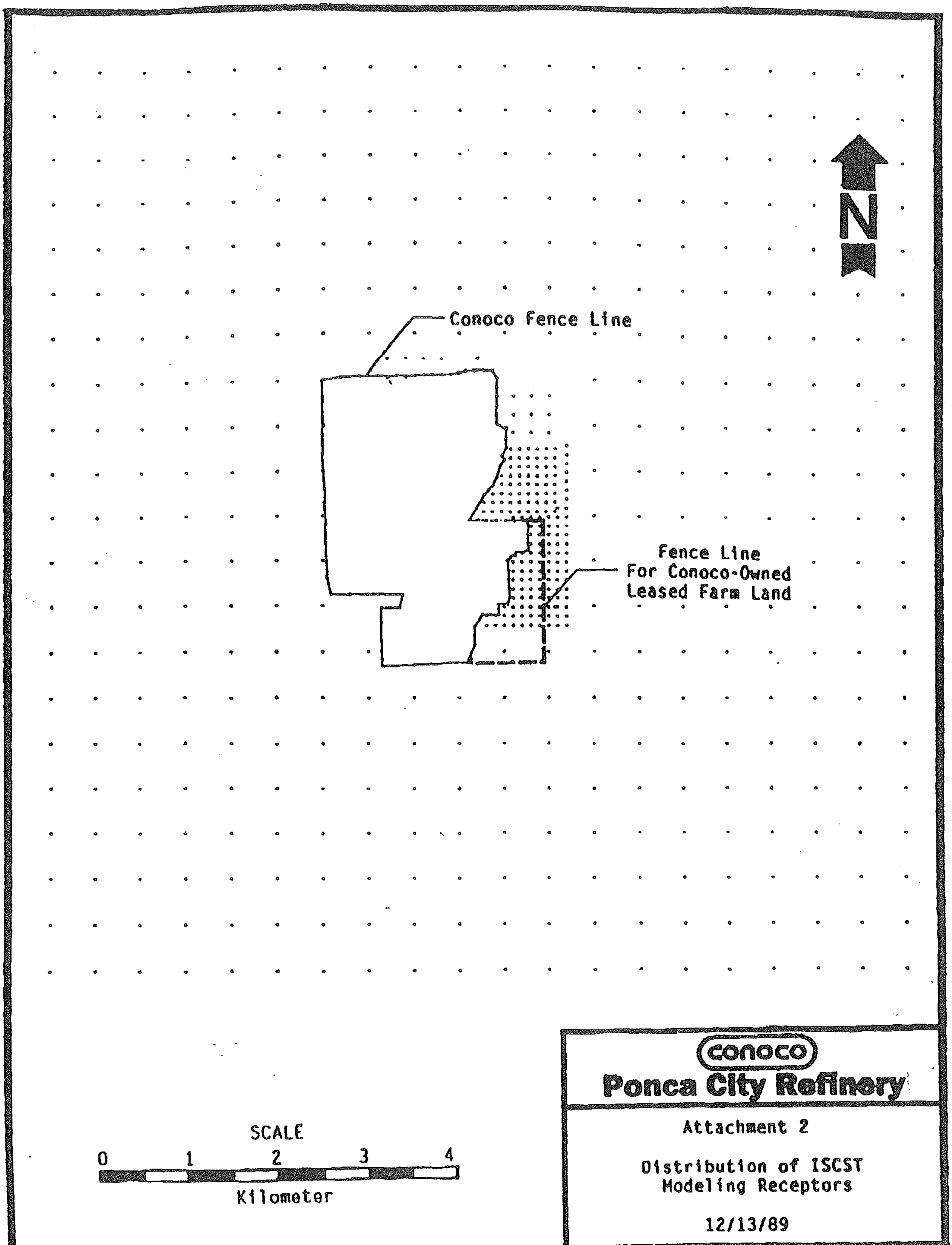

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Attachment 2

Distribution of ISCST
Modeling Receptors

12/13/89

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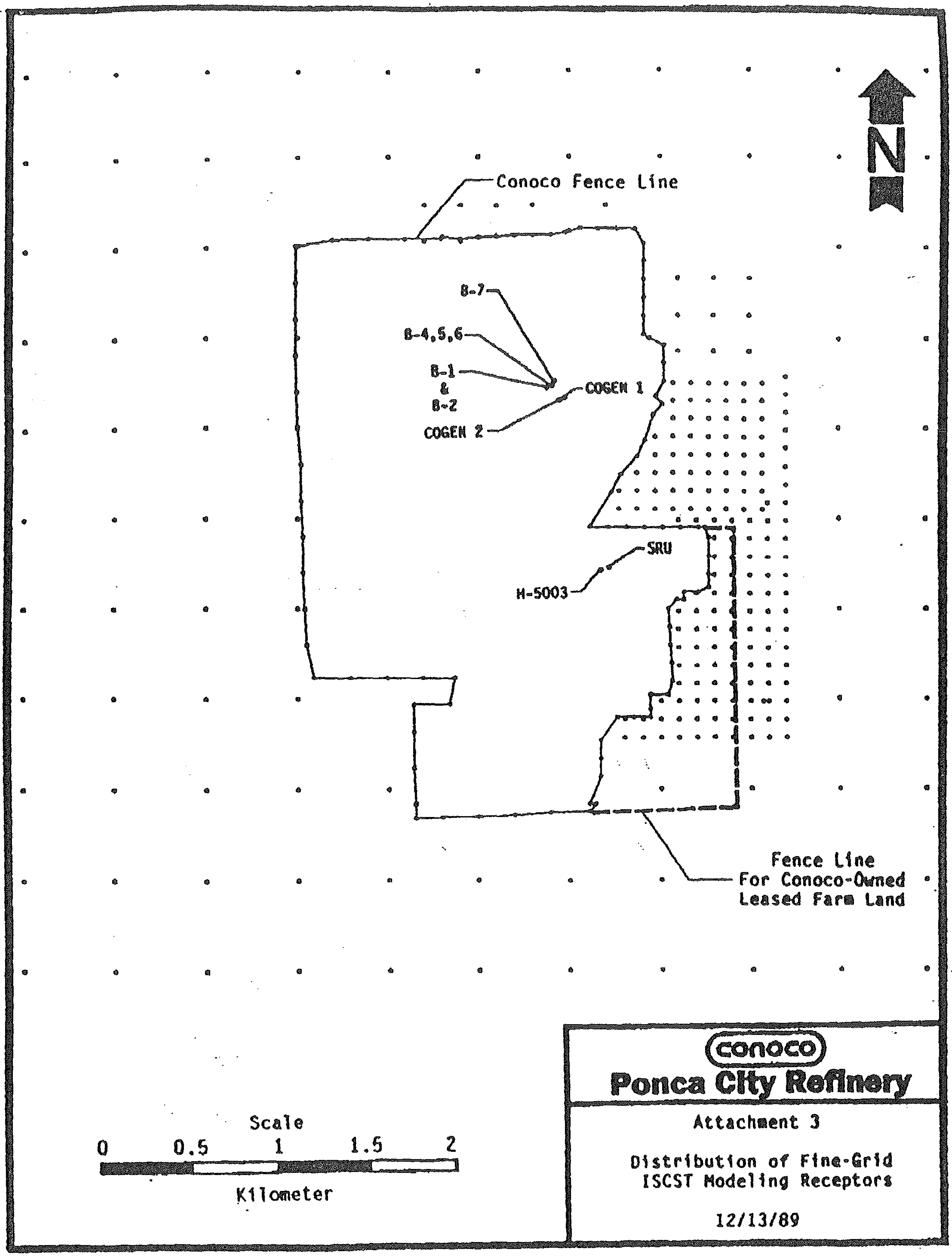

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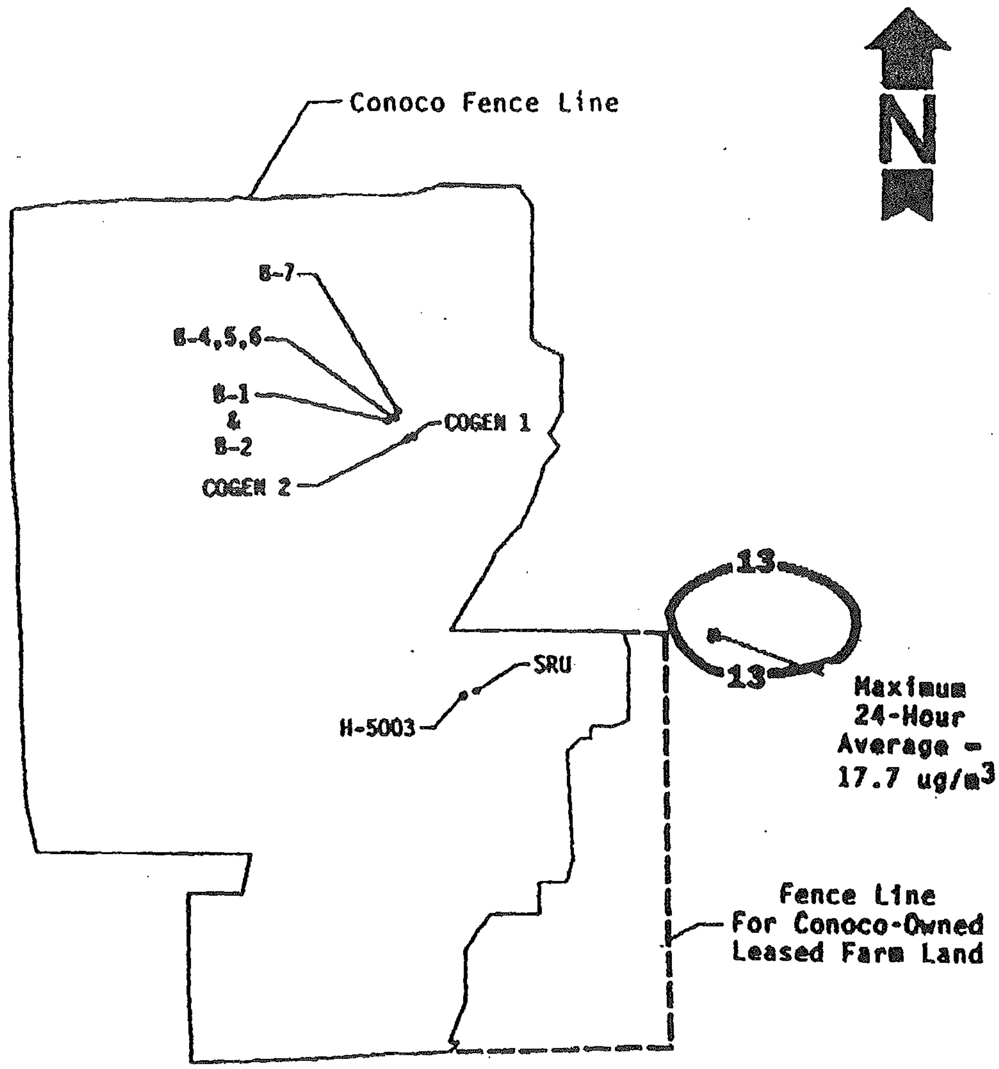
Attachment 3

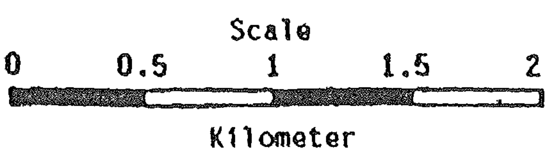
Distribution of Fine-Grid
ISCST Modeling Receptors

12/13/89

89287



NOTE: EPA's Level II significant concentration for SO_2 is 13 ug/m^3.



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Attachment 4

Location of 24-Hour
Level II Significance Area

12/13/89

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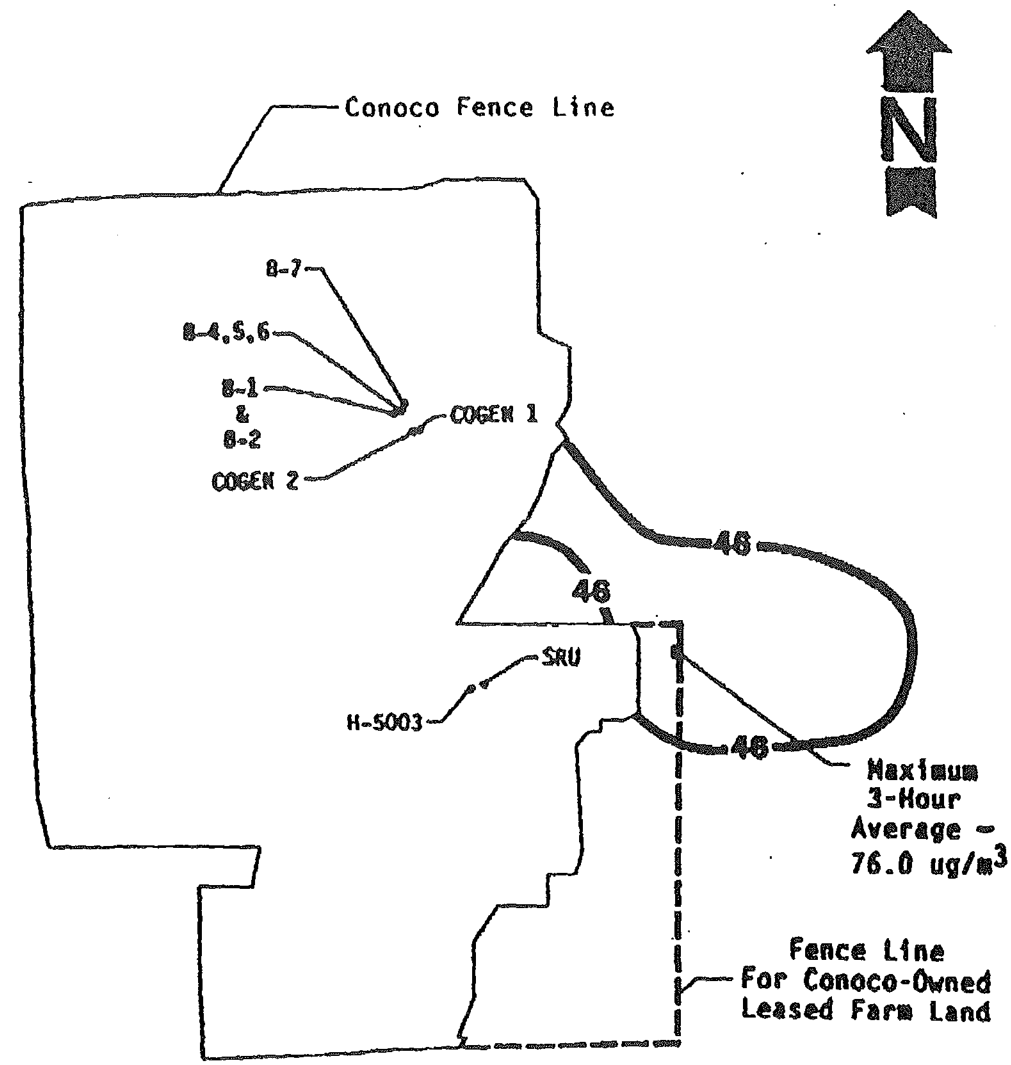

NOTE: EPA's Level II significant concentration for SO_2 is 46 ug/m^3.

Scale

0 0.5 1 1.5 2

Kilometer

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Attachment 5

Location of 3-Hour Level II Significance Area

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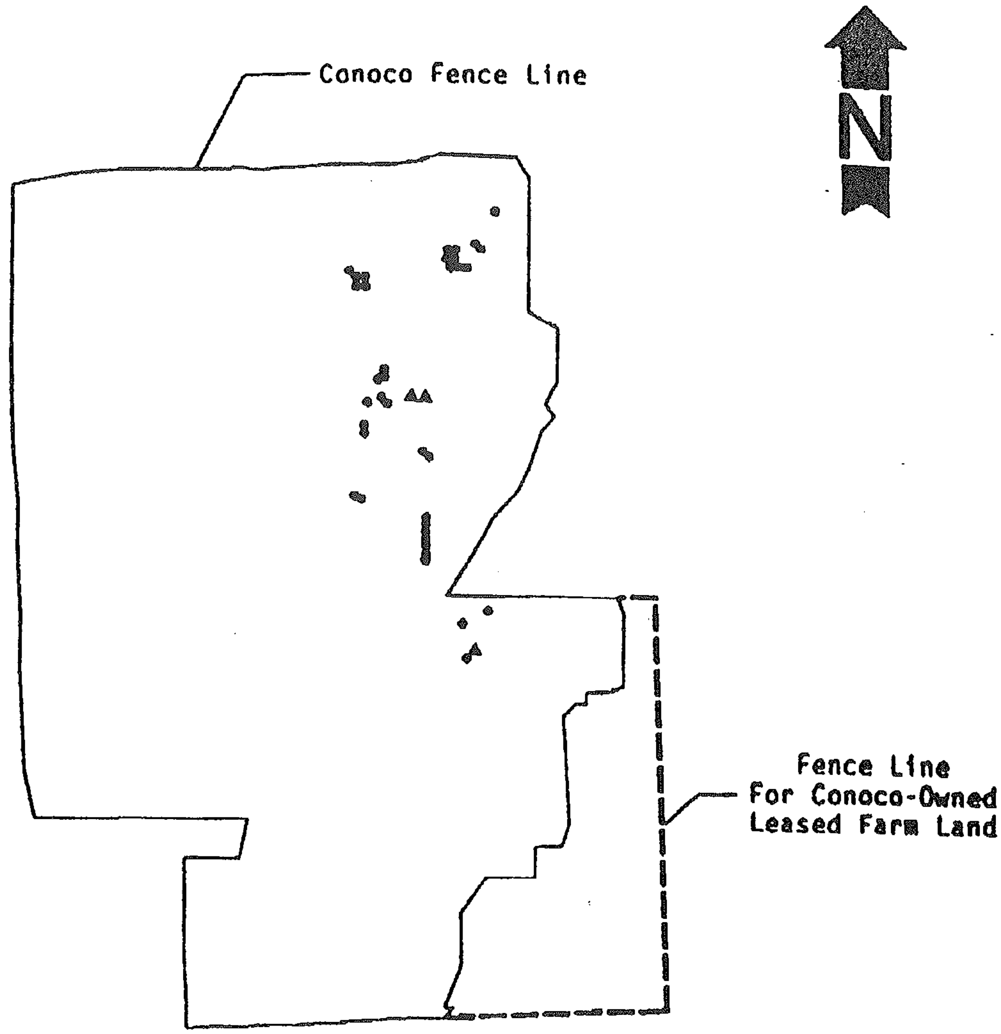

Legend

- • Existing SO_2 source
- ▲ Proposed SO_2 project source

Scale

0 0.5 1 1.5 2

Kilometer

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Attachment 6

Locations of Existing and Proposed SO_2 Sources

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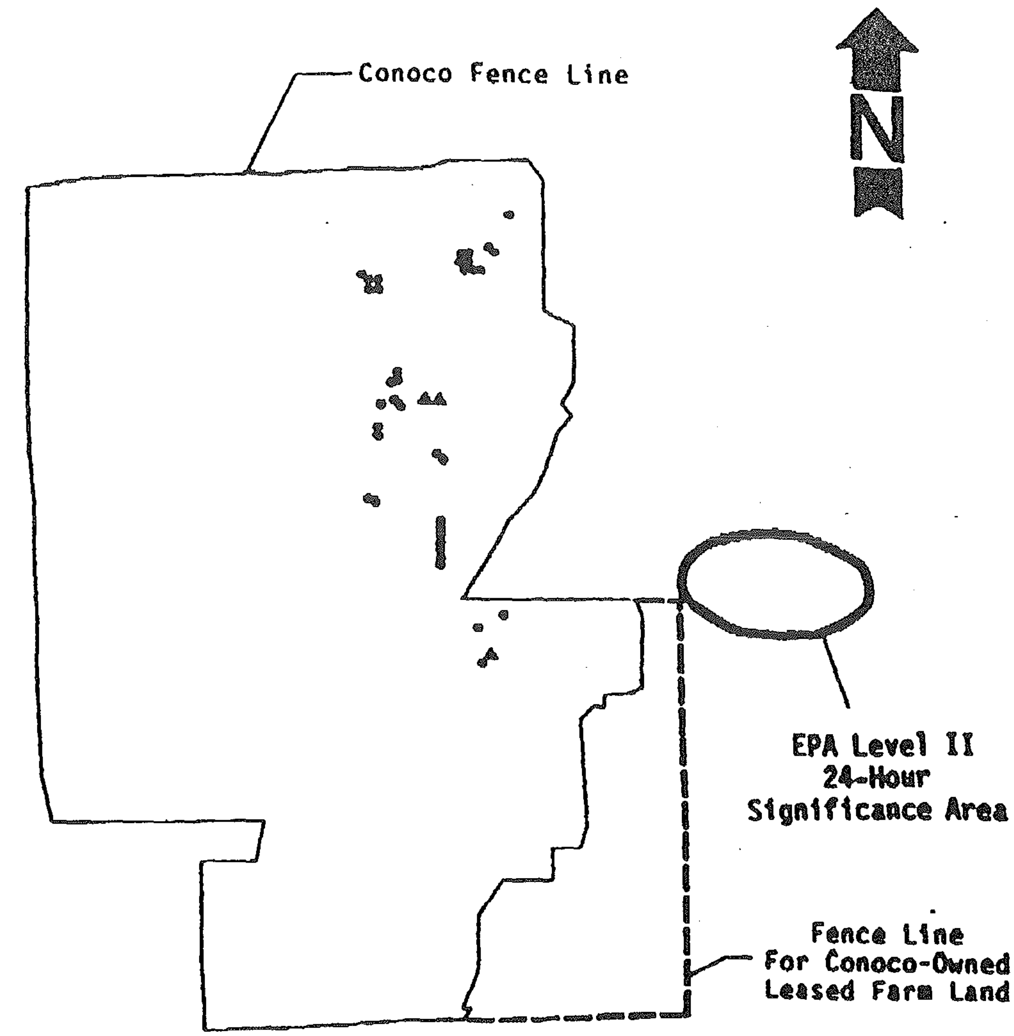

Legend

- Existing SO_2 source
- ▲ Proposed SO_2 project source

Scale

0 0.5 1 1.5 2

Kilometer

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Attachment 7

SO_2 Sources and Level II
24-Hour Significance Area

12/13/89

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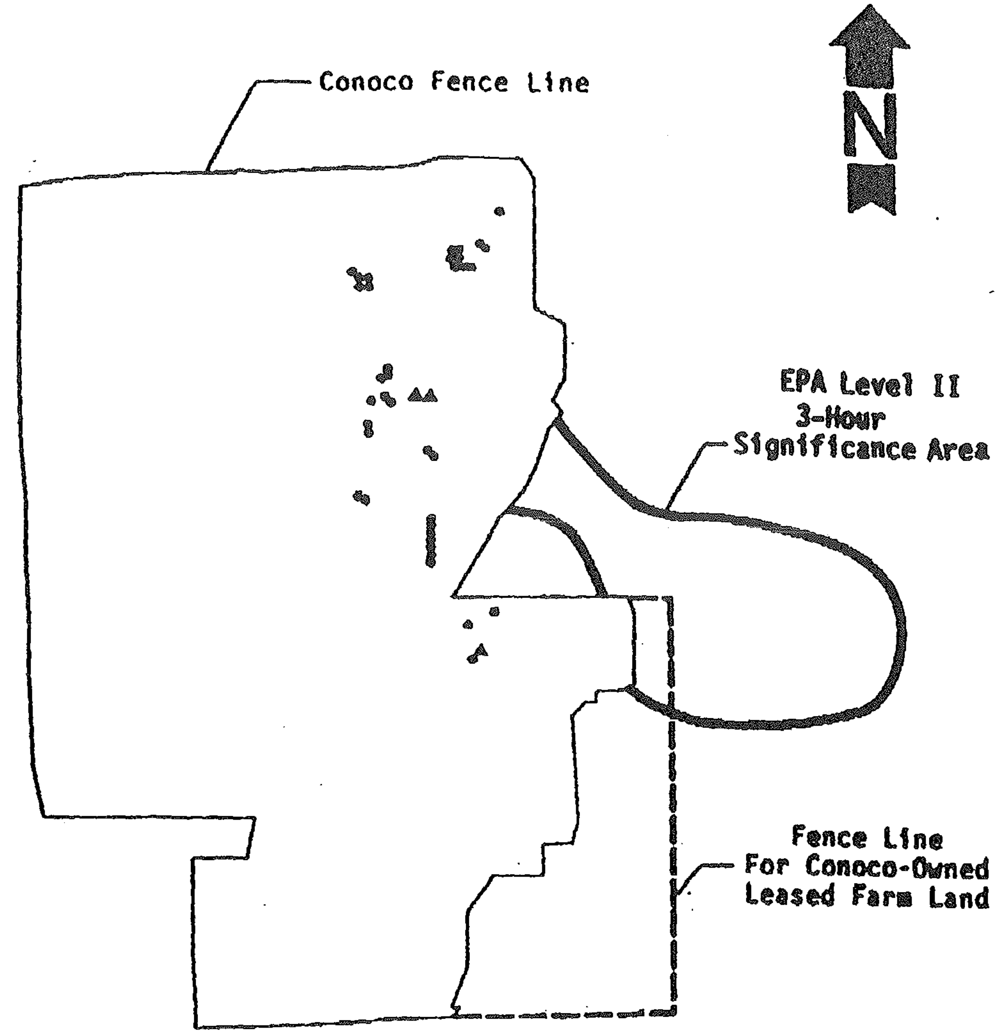
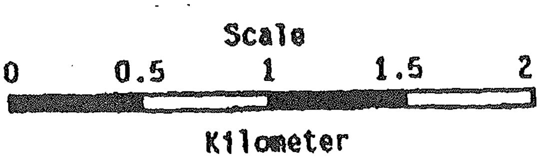


Legend

- • Existing SO_2 source
- ▲ Proposed SO_2 project source



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Attachment 8

SO_2 Sources and Level II
3-Hour Significance Area

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