

**Sacramento Federal Non-Attainment Area
Rice Straw Emission Reduction Credit Model Rule
Support Document (White Paper)**

October 16, 2008

Executive Summary

The Districts in the Sacramento Federal Non-Attainment Area (SFNA) have developed a model RICE STRAW EMISSION REDUCTION CREDIT rule to establish procedures which ensure federal recognition of the banking of Emission Reduction Credits (ERCs) resulting from the permanent reduction of open field burning of rice straw.

Background

Rice straw burning in the Sacramento Valley was "phased down" pursuant to state law adopted in 1991 (California Health & Safety Code (CH&SC) 41865). Some Districts in the SFNA have previously used their existing banking rules to issue emission reduction credits (ERCs) to growers. The United States Environmental Protection Agency (EPA) did not recognize the credits issued as being valid offsets for "federal purposes" (i.e. major modification projects or new major stationary sources).

The SFNA Districts have worked in conjunction with the Sacramento Valley Basin Control Council (BCC) and the California Rice Commission to address all concerns and comments raised by the California Air Resources Board (ARB) and the US EPA. It is also expected that other Districts in the Sacramento Valley might choose to use this rule as a model to develop a similar program.

Project Goals

The common goal for this project was to work with all stakeholders to create a model rule which will:

- Develop a consistent program for issuance of ERCs for all credits generated from reductions in rice straw burning within the SFNA. The model rule together with this white paper, form the basis for the program. However, as is always the case during rule promulgation (due to staff recommendations, public comments, board decisions), any District's adopted rule might contain slight variations. Each district participating in this process has the ability to propose changes which are more restrictive, but not less restrictive, unless they obtain case-by-case approval from the EPA and ARB.
- Ensure that any credits generated can be used for "federal purposes".

Rule structure

The concept for this project is to have this model rule address issues specifically applicable to rice straw credits, and keep provisions related to banking and transfer of credits in the Districts' existing general ERC rules. EPA recommended this approach in a January 27, 2005 letter from Region IX Regional Administrator Wayne Nastri to the BCC Vice Chair Curt Josiassen. Following adoption of this rule (by any District in the SFNA which desires to participate), a local version of this rule will be submitted for inclusion in the State Implementation Plan (SIP) in order to make the provisions federally enforceable.

Discussion of Proposed Rule Requirements

By following the procedures in the model rule, these credits will be recognized by the Districts, the ARB, and the EPA.

Conceptual requirements

Even though the model rule doesn't define all of the following terms, this rule ensures that any credits banked in accordance with the requirements in this rule meet the five (5) criteria established for credits: real, quantifiable, surplus, permanent, and enforceable.

A. Real

The typical definition for "real" as it relates to traditional credits, and as defined in most Districts' general ERC rules is "Actually occurring, implemented, and not artificially devised."

As this relates to cessation of rice burning, for each ERC application we need to ensure that 1) the emissions did occur from rice burning during the baseline period on a given number of acres (those applying for credits), and 2) the rice burning after the phase down is complete (2001) is limited to 25% (or less) of the historic acreage values.

- 1) Each applicant will be required (by Section 402.2) to submit documentation of the number of acres of each parcel that were used to grow rice during the baseline period (calendar years 1988 through 1992) as well as (by section 402.3) documentation that rice straw was burned during the baseline on the acreage. For more information on documentation, see the Administrative Requirements section later in this White Paper.
- 2) For rice burning after the phase down was complete, state law requires that the amount of acreage be limited to 25% of the acres of rice grown. This requirement is in effect whether or not a grower applies for ERCs, however for any grower who does apply for ERCs, sections 305, 306, and 307 further establish procedures to ensure the reductions do actually occur and are therefore real. Because this banking action is tied to a specific parcel (of fixed acreage) that grew rice during the baseline, there is not a concern about farmers growing more rice. If there are new fields of rice planted (that weren't planted in rice during the baseline), these would not be eligible for banking, even if they ceased burning.

B. Quantifiable

The typical definition for "quantifiable" as it relates to traditional credits, and as defined in most Districts' general ERC rules is "Ability to estimate emission reductions in terms of their amount and characteristics. The same method of estimating emissions should generally be used to quantify the emission levels before and after the reduction."

As this relates to cessation of rice burning, we need to be able to accurately determine the emission levels before and after the reduction. In general, the emissions are calculated as follows:

$$\text{Emissions (lbs)} = \text{Acres grown (acres)} * \text{HBF (\%)} * \text{EF (lbs emissions/ton of material)} * \text{FL (tons material/acre)}$$

Where HBF = historic burn fraction, in % of acres grown which were burned
EF = emission factor, in lbs of emissions per ton of material burned
FL = fuel loading, in tons of material per acre

In general, the historic practice prior to phase down for the growing of rice was to burn most, if not all of the acres of field stubble following harvest of the rice. For the Sacramento Valley, the value is in the range of 85 to 100%. When each District promulgates their individual rule, each District will establish their District specific HBF, subject to approval by EPA.

The emission factors and fuel loading factors used in the model rule come from an ARB memo, which was originally released 8/17/2000 and updated 9/12/2000. The factors in the memo are cited as being predominately from Bryan Jenkins' "Atmospheric Pollutant Emission Factors from Open Burning of Agricultural and Forest Biomass by Wind Tunnel Simulations", 1996, UC Davis. These factors are sometimes referred to as Jenkins II emission factors. The Jenkins II document includes factors (in pounds of emissions per ton of rice straw burned as well as fuel loading (in tons per acre). Because this rule only deals with credits from rice straw, the fuel loading number will be a constant value of 3.0 tons per acre. For simplicity, the rule will combine these 2 terms (EF and FL) into a single Emission Factor, as identified in the rule in Section 303.

Since the model rule specifies that these are the (only) emission factors to be used, the only variable that must be verified on an application by application basis is the rice growing acreage, which is defined in Section 219 as the number of acres contained in a parcel that was used for production of rice during the baseline period. Section 402.2 requires the applicant to submit documentation (such as rice sales records) of such acreage.

C. Surplus

The typical definition for "surplus" as it relates to traditional credits, and as defined in general ERC rules for the Districts in the SFNA is:

"The emission reductions shall be surplus reductions in excess of any emissions reductions which is:

- a) required or encumbered by any laws, rules, regulations, agreements, or orders, **except the requirements of and unless such law by its terms states that the emission reduction shall be considered surplus;** or
- b) attributed to a control measure noticed for workshop in the District, or proposed or contained in the State Implementation Plan; or

c) proposed or contained as near-term measures in the District Air Quality Attainment Plan for attaining the annual reductions required by the California Clean Air Act.”

As this relates to cessation of rice burning, the caveat at the end of the first option (shown in bold and italics) would apply. The practice of wide spread rice burning was phased down (to 25%) as required by the Connelly-Areias-Chandler Rice Straw Burning Reduction Act of 1991 (codified in CH&SC 41865), however that state law specified that the resulting reductions were to “qualify for air quality offsets” and were not to be relied upon for “purposes of attainment planning” or “progress towards the attainment of any state or national ambient air quality standard”.

The maximum amount of acreage that growers will be allowed to bank (which will be federally recognized) in accordance with section 302 of this rule is 75% of their total eligible acres times the HBF. For those Districts which establish a HBF of 100%, reducing rice burning to 25% would result in a 75% reduction. In Districts which substantiate a lower historic burn fraction, the percentage available to bank will be slightly less.

If a grower wants to commit to reductions even beyond the 75%, those additional acres might still be eligible for banking in accordance with a District’s regular banking rule, but those additional credits would be for “state purposes” only and not federally recognized.

In addition to the above definition in Districts rules, there are a few other related provisions:

1. Surplus at time of use

In a November 7, 2000 letter from EPA region IX (Gerardo Rios) to the Yolo-Solano AQMD (Mat Ehrhardt) in response to public notification for initial agricultural burn ERC applications, EPA stated that “emission reductions used as offsets must be surplus at their time of use. An emission reduction is considered surplus if the District has not relied on it for attainment demonstration or reasonable further progress.”

Section 173(c)(2) states that “Emission reductions otherwise required by this Act shall not be creditable as emissions reductions for purposes of any such offset requirement...” which EPA has interpreted to mean that ERCs must be surplus at the time they are used as offsets.

The 1994 Sacramento Regional Clean Air Plan (available at <http://www.airquality.org/cleanairplan/94SACSIP.pdf>) was developed cooperatively with all the districts in the Sacramento Region (El Dorado County AQMD, Feather River AQMD, Placer County APCD, Sacramento Metropolitan AQMD, and Yolo-Solano AQMD) and was adopted in 1994 in compliance with the 1990 Amendments to the Federal Clean Air Act. That SIP did not rely on any emission reductions from the agricultural burning source category. The SIP for the 8-hour ozone standard is currently under development and does not rely on any emission reductions from the agricultural burning source category (per state law cannot rely on any reductions from rice straw burning). Therefore, these

reductions will never be relied upon in a SIP and will always be surplus at time of use.

2. In the SIP inventory

In the November 7, 2000 letter, EPA also stated that "...In addition, emission reductions that are to be used as offsets must be extracted from the most recent emissions inventory being used for State Implementation Plan (SIP) planning purposes."

In addition, in an October 30, 2003 letter from EPA region IX (Jack Broadbent) to the Yolo-Solano AQMD (Larry Greene) and to each SFNA District, EPA stated that "...will require revisions to the current emissions inventory and clean air plan for the Sacramento Valley Non-attainment Area..."

Based on the fact that agricultural burning is an "area wide" source category (as opposed to a "point source" category), the emissions inventory for this category are tracked on a District wide basis, not a grower by grower basis.

To satisfy these EPA comments that the Volatile Organic Compound (VOC) and Nitrogen Oxide (NOx) emissions must be in "the most recent emissions inventory being used for SIP planning purposes", the 2002 emissions inventory has been updated to include emissions from agricultural burning, including rice straw burning. Table 1 shows the updated emissions inventory for the one specific Emissions Inventory Category (EIC) 670-662-0262-000 which covers field crops, including rice straw burning emissions.

District	2002	
	VOC (tpd**)	NOx (tpd**)
Feather River	0.299	0.261
Placer	0.124	0.022
Sacramento Metropolitan	0.113	0.083
Yolo Solano	0.136	0.089
Total	0.672	0.455

* Emissions Inventory Category (EIC) 670-662-0262-000 for Field Crops

** The above numbers were calculated on a "summer day average"

In addition to the above listed quantities of 2002 agricultural burning emissions which are in the SIP planning inventory, an adjustment for ERCs was made to the inventory which will be used for photochemical modeling to determine the carrying capacity (design value) for the attainment demonstration document that is being prepared for the 2007 8-hour ozone SIP. The adjustments which have been made by ARB account for the total quantities of emission reduction credits

which could be banked as part of this rule. This is being done to demonstrate that ERCs are accounted for in the attainment demonstration document.

It is important to note that the units used in the following table are on a "summer planning day average" because the SIP relies on demonstrating attainment during the summer ozone season. Because rice burning activity was historically higher during parts of the 1st and 4th quarters, this table should not be used to estimate the total amount of credits that might be issued. Therefore, these values should not be compared to other annual values or tables.

District	Total Banked ERCs (tpd**)		Available to be banked Rice ERCs (tpd**)		Total Modeled ERCs (tpd**)	
	VOC	NOx	VOC	NOx	VOC	NOx
Feather River***	0	0	0.29	0.32	0.29	0.32
Placer	0.394	0.045	0.13	0.14	0.524	0.185
Sacramento Metropolitan	2.075	1.141	0.12	0.13	2.215	1.301
Yolo-Solano	0.082	0.137	0.32	0.35	0.402	0.487
Subtotal	2.551	1.323	0.86	0.94	3.411	2.263
Totals modeled	2.6	1.4	0.9	1.0	4	3

* See Attachment 1 for calculations

** Summer planning day average

*** Represents acreage in the South Sutter portion of Feather River which is in the SFNA

**** See the "Sacramento Regional 8-hour Ozone Attainment and Reasonable Further Progress Plan", Draft Report September 10, 2008, page 5-17

In addition to the above quantities of VOC and NOx, it is the intent of the working group to also allow banking of the other criteria pollutants of Carbon Monoxide (CO), Sulfur Oxides (SOx), and Particulate Matter less than 10 microns (PM10). Because none of the Districts¹ in the SFNA have prepared a SIP for any other pollutant, there is not an "emissions inventory used for SIP planning purposes" issue for these pollutants. However, the ARB emissions almanac inventory does have the correct values for the historic emissions for these other criteria pollutants.

3. Not required by any regulation in the SIP

In the November 7, 2000 letter, EPA also stated that "...Finally, the emission reduction cannot be required by current regulations in the SIP."

There are no rules in the SIP which require reductions from rice burning as a source category.

D. Permanent

¹ Note: the California Air Resources Board has prepared a carbon monoxide SIP for parts of the Sacramento Metropolitan Air Quality Management District.

The typical definition for "permanent" as it relates to traditional credits, and as defined in most Districts' general ERC rules is "The sum of all ERC's endures for the life of the project utilizing that sum of ERC's." Though not specifically defined in any statute, commonly credits that are expected to last at least 30 years are considered "permanent". Just for comparison purposes, a credit that is issued for a source such as a vehicle which would have a limited useful life before being naturally turned over, might have a much shorter life, such as for only 7 years.

As this relates to cessation of rice burning, we need to be able to demonstrate that there is a mechanism set up to ensure that rice straw in excess of 25% of the acreage is never burned on the property again. This is done in Sections 305, 306 and 307, which deal with deed restrictions, restricted burn lists, and burning prohibitions. Section 305 requires that prior to issuance of an ERC, a deed restriction shall be placed on the property that limits the agricultural burning on the parcel to no more than 25% of the total acreage in any calendar year. These deed restrictions are filed with the county assessor's office and stay with the property in perpetuity. Section 306 requires that prior to issuance of an ERC, the District will place the property on a restricted burn list, which is a list of properties which cannot burn more than 25% of the acreage in any calendar year. Section 307 states that no person shall conduct agricultural burning on more than 25% of the rice growing acreage of a parcel that has received an ERC in accordance with this rule.

The CH&SC section 41865(j) has a provision that allows the state board to determine if an "extraordinary circumstance, such as an act of God..." exists and allow the maximum allowable burnable acres (the 25% limit) to be exceeded. It is important to note that subsequent to SIP submittal and approval, any grower who banks ERCs in accordance with this rule will be bound by this limit of 25%.

If at any time in the future a property owner wanted to start burning again, if the credit which was issued for that property had not been used, the owner could surrender the ERC and the District would sign off on removing the deed restriction from the property.

District agricultural burning rules will prohibit burning where ERCs have been issued. Failure to comply will result in the application of penalty provisions prescribed in state and federal law.

E. Enforceable

The typical definition for "enforceable" as it relates to traditional credits, and as defined in most Districts' general ERC rules is "Verifiable and legally binding."

As this relates to cessation of rice burning, upon promulgation of a version of the model rule (including proper notice and findings), the requirements would be enforceable by the District in accordance with the powers granted to the District by the CH&SC.

In the November 7, 2000 letter, EPA stated that "the emission reductions must be practically enforceable as well as federally enforceable...since ag-burning credits are generated by un-permitted sources, establishing the federal enforceability...will likely require some additional implementing mechanism."

In the October 30, 2003 letter, EPA stated that "Additionally, the air pollution control district in which each participating farm is located will need to promulgate an offset-generating rule for rice straw burning. This rule must contain provisions to make the reductions in rice straw burning enforceable and permanent and would also have to contain an appropriate emission quantification protocol. This rule would have to be incorporated into the SIP."

The practical enforceability for the Districts consists of the use of the deed restrictions (section 305) and the restricted burn list (section 306) used as part of the burn permits that each District requires for agricultural burning. Before a grower obtains ERCs, they are restricted by the restricted burn list to not burn more than 25% of the acreage in any calendar year. If a grower violates this provision, the District would have the authority to issue a Notice of Violation (NOV).

The requirements in sections 305 and 306 are also the implementing mechanism that will make the reductions "federally enforceable". As stated earlier, each District that is choosing to participate with this working group will be promulgating a version of this rice straw model rule. The Districts have committed to submit the rule into the SIP, and as such, as soon as approved into the SIP, the ARB, the EPA, and/or the public would also have the ability to enforce the requirements of the rule.

Administrative requirements

Most of the Districts' general ERC rules establish most of the administrative requirements related to banking actions, such as priority reserve, completeness determination, preliminary decision, public inspection, publication and public comment, and fees. In order to accomplish the above conceptual requirements, several additional administrative requirements are placed in this rule, as follows.

A. Applicant qualifications

The Districts expect that there will be two types of applicants, those who previously banked ERCs (defined in this rule as re-certification applications) and those who are filing applications for the first time (new applications).

B. Application deadline

The local version of the rule will require (section 401) that all applications to bank ERCs in accordance with the local rule must be submitted within 12 months from the date of adoption of the local rule.

C. Application information

The applicant for a new application will be required by section 402 to submit general information, including the list of parcels (by assessors parcel number and any other designation or field number), the name of the parcel owner, the amount of acreage which burned rice during the baseline period, and documentation that rice straw burning occurred during the baseline.

To document that rice straw was burned during the baseline period, the applicant will be required to submit either a copy of a burn permit or other District approved record.

Examples of other types of District approved records could include records (such as sales records) proving that rice was grown on a parcel. Absent any other records, some districts may accept a signed affidavit (under penalty of perjury) that rice burning occurred during the baseline period.

The reason that the District's can be flexible on what type of documentation is acceptable for this program, is the fact that on a region wide basis we know the total rice acreage that was actually burned during the baseline, even if we don't know specifically which grower burned it. Based on this, we set up the rule so that we don't have to take final action on applications until up to 180 days after the one (1) year filing deadline has passed and all rice growers have had a chance to submit an application. This way, we can ensure that ERCs are not issued for more acres than we know were burned. If we get more applications (with "proof" or "affidavits") than we expect, section 404 specifies that the percentages will be adjusted down so that the total doesn't exceed the inventory that we knew existed during the baseline. Any existing ERC holders that apply to re-certify their credits will be given credit first, then any new applications with verifiable records will get credits (so long as the total of these applications does not exceed the total limits), then any remaining credits will be prorated to new applications with affidavits. This system will ensure that the total amount of credits issued doesn't exceed the actual emissions emitted during the baseline period.

D. Records

The rule will require that for any parcel for which an ERC is granted, the ERC applicant or current land owner shall keep records of the acres, crop type, and burning that has occurred in the previous five years. This information will be used to verify that going forward, the parcel does not ever exceed its' 25% limitation.

E. Other

For ERCs that were previously issued as the result of an initial application, there will be a few nuances, as follows:

- 1) The current holder will have the option of either keeping their current ERC or re-banking (re-certify) their ERCs in accordance with the provisions of this rule. It is expected that in nearly every case, it would be in the holder's best interest to re-certify their ERC in order to get the credits federally recognized. In order to re-certify their ERC, the holder would still be required by section 403 to submit an application (within the 12 month deadline) and surrender their existing ERC.
- 2) One option that the Districts plan on offering to growers who hold ERCs resulting from previous banking actions is to allow them to adjust their acreage at the time of re-banking. In the initial applications, several growers took restrictions to not allow any burning on their parcels (i.e. instead of maintaining the ability to burn 25% of their acreage). Other growers picked levels that were somewhere between 0% and 25%, referred to as "discount acres". Because anything beyond the last 25% will not be federally recognized, at the time of re-banking, the growers will be given the option to adjust their "discount acreage" anywhere up to 25%. If an applicant chooses not to adjust up, any credits beyond the 75% level would be "state only" credits and would not be federally recognized.

- 3) The 8-hour Rate Of Progress (ROP) plan which was completed in December 2005 as part of the SIP identified the previously banked agricultural burning ERC certificates (dealt with in this rule as re-certification applications), identified separately by each owner and location and by each District. However, because most of these credits will likely be re-banked using this rule (in order to get federal recognition), and as a result the certificate numbers as well as the quantities will change, as part of the SIP attainment demonstration document, the previous certificates will not each be identified separately.

BANKABLE RICE-STRAW BURNING ERC CALCULATIONS

INTRODUCTION:

The purpose of this evaluation is to establish the amount of rice-straw burn emissions available to be banked from emission reductions due to Connelly Rice Straw Burning Reduction Act (Connelly Act) of 1991. The Act limited the amount of rice that could be burned in a given year to 25% of the acreage planted in that year, resulting in up to a 75% “phasedown” of rice burning. This reduction is eligible for banking with federal recognition under this program. The rice-straw burn emissions will be added as an ERC (unbanked) to the current SIP planning inventory for the plan before any ERCs can be issued. The SFNA will have to demonstrate attainment with the federal ambient air quality standard with the added rice-straw burning emissions.

EMISSIONS CALCULATIONS:

ERCs are issued in units of pounds of emissions per calendar quarter, so we need to determine how much rice straw was burned on an annual basis (as opposed to the cumulative amount burned over the entire 5 year baseline of 1988 to 1992), then distribute that over the year in calendar quarters. To determine the amount of credit available, each District must determine a single year during the 1988 to 1992 baseline period which is a “representative” year. The factors that complicate determining the “representative” year include: the fluctuation in the number of acres planted from year to year, the fluctuation in the percentage of acres burned from year to year (see HBF discussion below), crop rotation, and lack of historic data.

Acres planted - The best data available (related to rice) are the records of rice planted in each county, maintained by the United States Department of Agriculture (USDA). The records show the amount of rice planted in each county for each year. The Districts looked at the ten years of 1982-1991 to determine the average amount of rice planted.

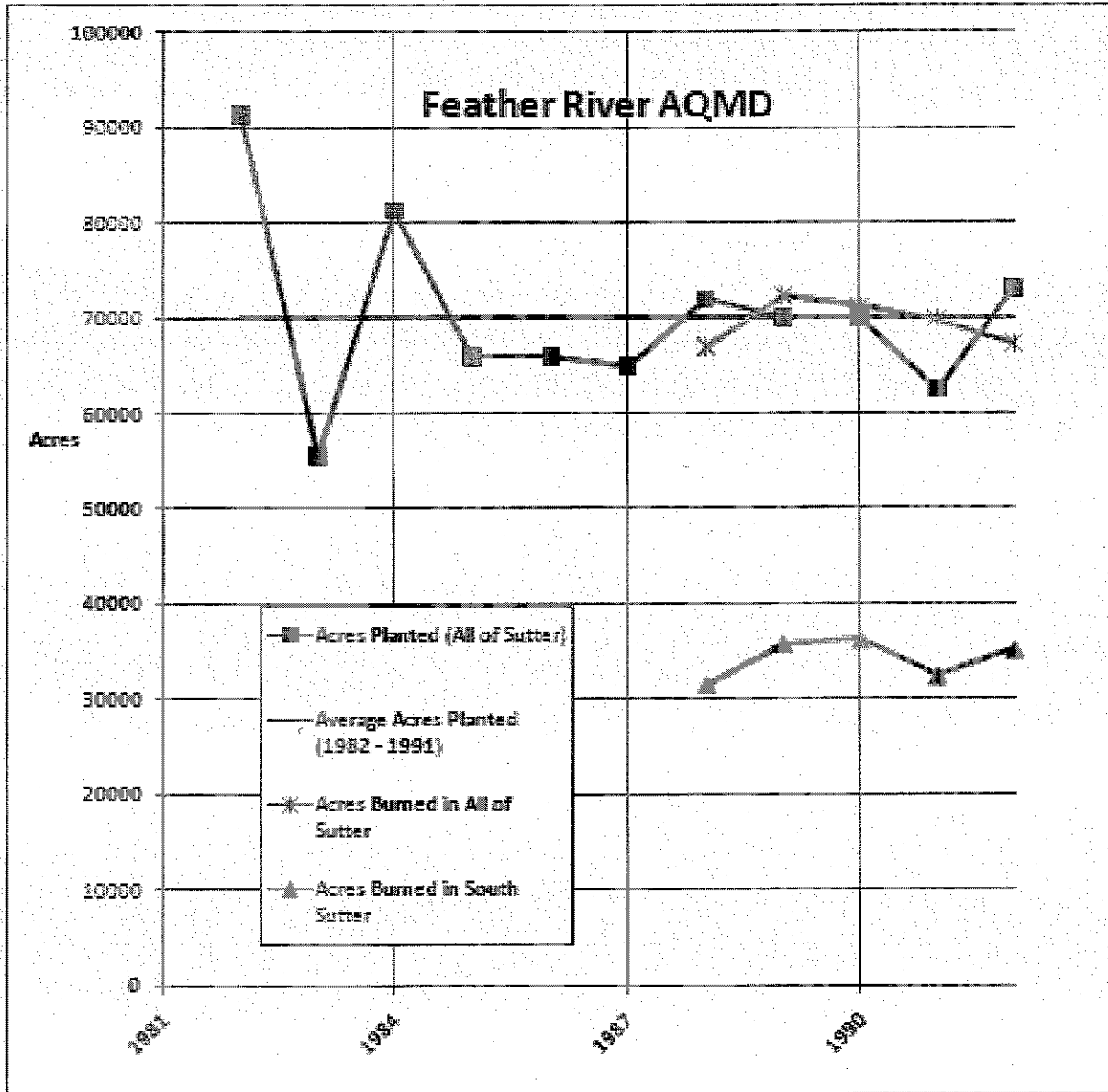
Crop rotation – Even though we are capping the total amount of credits using a single year for this banking program, a common practice for agricultural industry is to use crop rotation. Whichever year is picked as representative, any particular grower might not have grown rice in that year, but could have grown rice in the previous or following year. The Connelly Act provides that anybody who grew rice at any point during the baseline is subject to the phasedown and therefore entitled to bank reductions.

Historic Burn Fraction – The historic practice prior to the Connelly Act was to burn most, if not all, of the rice fields. This was done to kill weeds and insects and prepare the fields for the next years plantings. However, there were some times that the fields couldn't be burned because of factors like weather and no-burn days. Some of the available references include:

- 100% (1.0) in the Manual of Procedures (MOP),
- 100% - study done by TSS Consultants for Feather River,
- >99% - per the Sutter County Agricultural Commissioner,
- ~85% - bar graph in Figure III-1 of 1997 ARB report

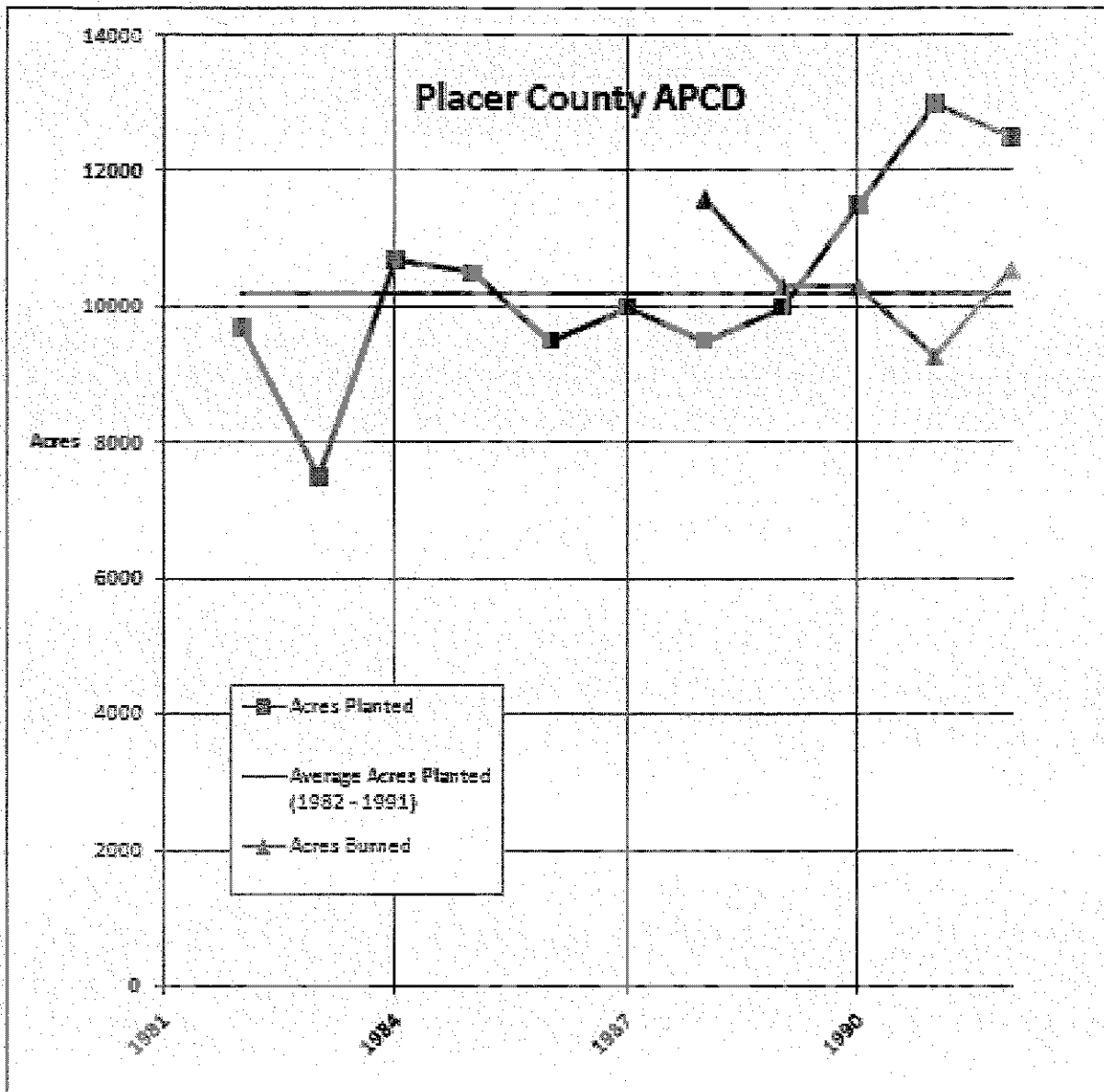
Considering all these factors, each District determined their “representative” year as follows:

Feather River AQMD:



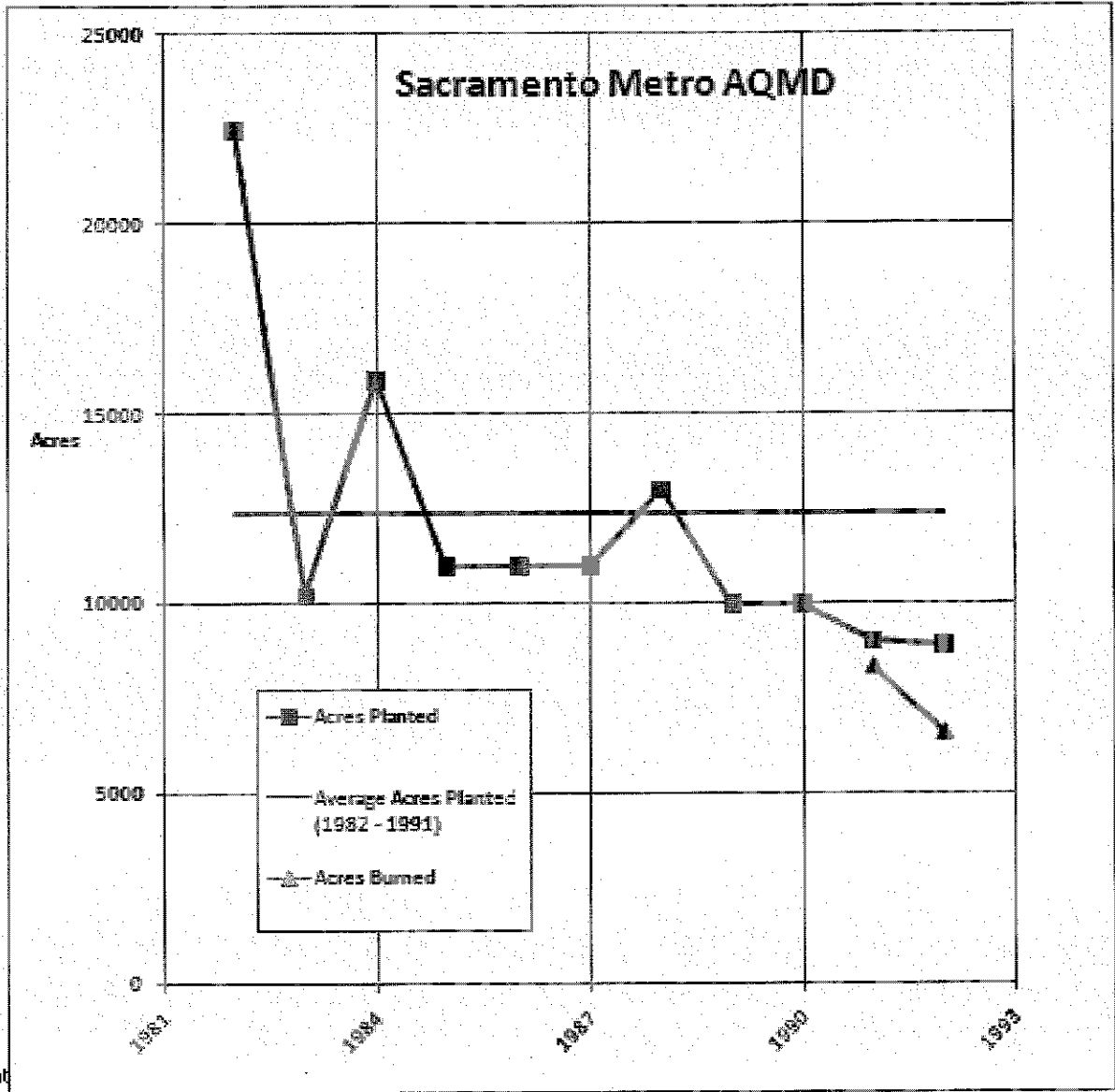
For Feather River, the USDA data shows the total acres planted by County, but does not distinguish the breakdown of what was planted in South Sutter County, which is the part of the County in the Sacramento SFNA for ozone. Using the County wide data, the average acres planted between 1982 and 1991 was 69,990 acres. The single year during the baseline for which the acres planted was closest to this 10 year average acres was 1990. In 1990, for South Sutter, there were 36,228 acres burned. Therefore, for Feather River AQMD, 1990 was the “representative” year for rice burning activity.

Placer County APCD:



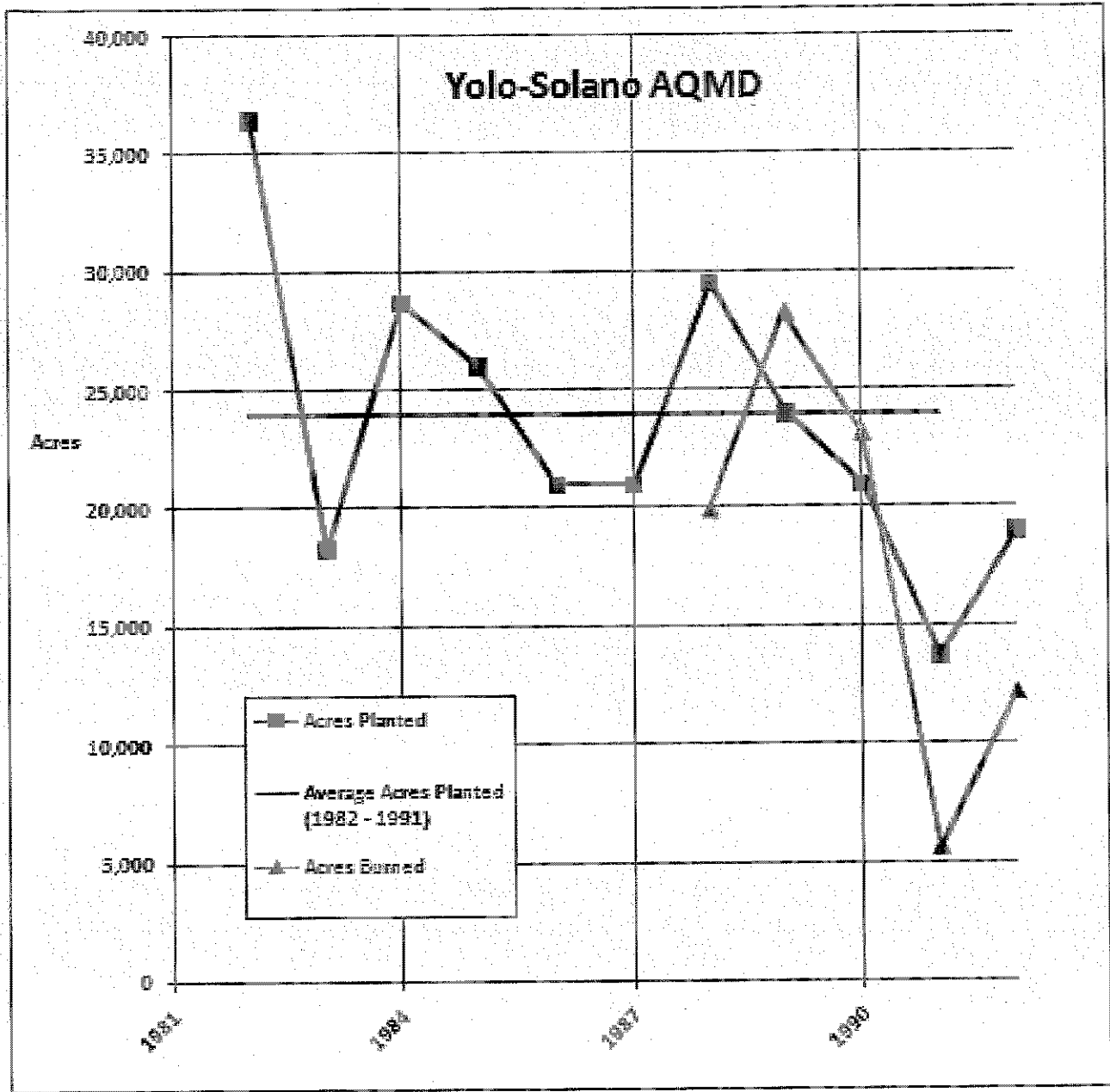
For Placer County, the average acres planted between 1982 and 1991 was 10,190 acres. The single year during the baseline for which the acres planted was closest to this 10 year average acres was 1989. In 1989, there were 10,303 acres burned. Therefore, for Placer County AQMD, 1989 was the “representative” year for rice burning activity.

Sacramento Metropolitan AQMD:



For Sacramento County, the average acres planted between 1982 and 1991 was 12,360 acres. The single year during the baseline for which the acres planted was closest to this 10 year average acres was 1988. The District does not have records of actual acres burned in 1988 (nor 1989 or 1990). Therefore, Sacramento is choosing to use the average of 1991 and 1992 as their "representative" year, during which time there was 7,474 acres burned. For 1991 and 1992, emissions between May 1st and October 31st account for 60% of the annual emissions.

Yolo-Solano AQMD:



For Yolo-Solano, it appears that the Districts burn data uses a different matrix of calendar year versus planting year, so the burn data trails (and correlates well with) the planting data by 1 year. The average acres planted between 1982 and 1991 was 23,970 acres. The single year during the baseline for which the acres planted was closest to this 10 year average acres was 1989. For 1989, the District does not have complete burn data, but the District does have complete data for 1988 and 1990 which show 95% of the acres planted in the previous year were burned. Applying that same analysis to 1988 planting data yields burn data of 28,279 acres for 1989. Therefore, for Yolo-Solano, 1989 was the "representative" year for rice burning activity. For Yolo-Solano, emissions between May 1st and October 31st account for 39% of the annual emissions.

Using these records, each District has selected a single calendar year during the baseline which will be used to limit the maximum amount of credits which can be issued on a District wide basis, while still ensuring that all growers who are entitled (by state law) to bank credits are able to do so.

District	Year	Acres
Feather River*	1990	36,228
Placer	1989	10,303
Sacramento Metropolitan	1991/2**	7,474
Yolo-Solano	1989	28,279

* Represents acreage in the South Sutter portion of Feather River which is in the SFNA

**Based the data available, Sacramento decided to use an average of the 2 years they have data for

Once we have the baseline year(s) and acres of rice burned during that year(s), we can calculate several things: total annual rice straw burning emissions, total annual rice straw burning emissions eligible for banking, estimated quarterly distribution, and the amount of VOC and NOx credits eligible for banking that need to be included in the 8-hour SIP attainment demonstration document.

Assumptions:

The emission factors (sometimes referred to as Jenkins II emission factors) come from an ARB memo, which was originally released 8/17/2000 and updated 9/12/2000. The factors in the memo are cited as being predominately from Bryan Jenkins' "Atmospheric Pollutant Emission Factors from Open Burning of Agricultural and Forest Biomass by Wind Tunnel Simulations", 1996, UC Davis. The units of the emission factors are pounds of emissions per ton of rice burned and fuel loading in tons of fuel per acre grown.

Crop	VOC (lbs/ton)	CO (lbs/ton)	NOx (lbs/ton)	PM10 (lbs/ton)	SOx (lbs/ton)	Fuel Loading (tons/acre)
Rice	4.7	57.4	5.2	6.3	1.1	3.0

The quarterly burn fractions (from the MOP) are slightly different for each District, as identified in Table 2.

District	1 st Quarter	2 nd Quarter	3 rd Quarter	4 th Quarter
Feather River	34%	22%	6%	38%
Placer	24%	21%	12%	43%
Sacramento Metropolitan*	6%	19%	27%	49%
Yolo-Solano	28%	26%	8%	38%

*Sacramento Metropolitan is proposing to use a quarterly distribution based on their actual data for 1991/1992

Total annual rice emissions:

The emissions are then calculated as follows:

$$\text{Emissions} = \text{Acres Burned} \times \text{Fuel loading (tons/acre)} \times \text{EF (lbs pollutant/ton fuel)}$$

Table A4 – Rice burning emissions during the baseline

District	Acres Burned	VOC Emissions (tons)	CO Emissions (tons)	NOx Emissions (tons)	PM10 Emissions (tons)	SOx Emissions (tons)
Feather River*	36,228	255.41	3,119.23	282.58	342.35	59.78
Placer	10,303	72.64	887.09	80.36	97.36	17.00
Sacramento Metropolitan	7,474	52.69	643.51	58.30	70.63	12.33
Yolo-Solano	28,279	199.37	2,434.82	220.58	267.24	46.66

* Represents acreage in the South Sutter portion of Feather River which is in the SFNA

Bankable rice emissions:

As allowed by this program, the maximum amount of federally recognized bankable emissions is equal to 75% of the baseline emissions.

$$\text{Bankable} = \text{Baseline Emissions} * 75\%$$

Table A5 – Maximum Rice burning emissions available for banking

District	VOC Emissions (tons)	CO Emissions (tons)	NOx Emissions (tons)	PM10 Emissions (tons)	SOx Emissions (tons)
Feather River*	191.56	2,339.42	211.94	256.76	44.84
Placer	54.48	665.32	60.27	73.02	12.75
Sacramento Metropolitan**	36.88	450.46	40.81	49.44	8.63
Yolo-Solano	149.53	1,826.12	165.43	200.43	35.00

* Represents acreage in the South Sutter portion of Feather River which is in the SFNA

**Based on their data, Sacramento Metropolitan is proposing to use an overall reduction of 70% ((85% HBF – 25% post reduction burning)/85%)

ERC Values for Attainment Demonstration Document:

When developing the SIP Attainment Demonstration Document, states normally account for ERCs which have already been banked prior to the base planning year. If the reductions occur after the base planning year, you need to be able to demonstrate that the emissions were accounted for as an emission source in the base planning year (in the SIP emissions inventory). For our region's SIP, the base planning year is 2002. For the 2002 planning inventory, the actual emissions from all burning (including rice) that was occurring in 2002 was accounted for. However, these rice ERCs were not banked at that point (at least, not with federal recognition) and a portion of the emissions were not occurring in 2002 because of the phasedown law. Therefore, the rice ERCs that are "eligible for banking" will be added to the baseline inventory to ensure they are accounted for in the modeling inventory for the attainment year. By making this adjustment, we can show that we will still reach attainment, even accounting for the emissions that will occur when these ERCs are used.

Because the photochemical modeling done for the attainment demonstration uses the summer ozone season, the units for these values will be in “summer planning day” averages, which are calculated using emissions between May 1st and October 31st and dividing by 184 days. In addition, the modeling only addresses ozone precursor pollutants of VOC and NOx.

Adjustment value = Annual Bankable Emissions (tons) * % emitted between May 1st and October 31st / 184 days

District	May 1 st to Oct 31 st emissions (%)	VOC Emissions (tpd*)	NOx Emissions (tpd)
Feather River*	28%	0.29	0.32
Placer	44%	0.13	0.14
Sacramento Metropolitan	60%	0.12	0.13
Yolo-Solano	39%	0.32	0.35

* Lacking monthly data for the Feather River District, we will use the 2nd and 3rd calendar quarters

Some Districts have already banked rice straw reductions, however these will need to be re-banked in order to obtain federal recognition. The values of the previously banked ERCs are likely to change substantially (because of updated emission factors, changes in surplus value), and therefore, the attainment demonstration document will not attempt to identify any of the existing rice ERC certificate values.

District	Total Banked ERCs (tpd)*		Available to be banked Rice ERCs (tpd)		Total Modeled ERCs (tpd)	
	VOC	NOx	VOC	NOx	VOC	NOx
Feather River	0	0	0.29	0.32	0.29	0.32
Placer	0.394	0.045	0.13	0.14	0.524	0.185
Sacramento Metropolitan	2.075	1.141	0.12	0.13	2.195	1.271
Yolo-Solano	0.082	0.137	0.32	0.35	0.402	0.487
Total	2.551	1.323	0.91	1.00	3.411	2.263

*Not including any existing banked rice ERCs