EMERALD FARMS

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August 21, 2007

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06-AFC-9
DATE AUG 21 2007
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Commissioner John L. Geesman, Presiding Member
California Energy Commission
1516 Ninth Street
Sacramento, California 95814-5512

Dear Commissioner John L. Geesman,

SUBJECT: COLUSA GENERATING STATION (06-AFC-9)

EMERALD FARMS' PSA COMMENTS

1. The PSA discussed the permanent conversion of agricultural land to industrial land without addressing the most important adverse, unmitigatible impacts of the conversion. The construction and operation of an electrical generating plant at the Colusa site is wrong because the load center that will use the electrical energy is miles away from it. Each mile of transmission results in losses of electrical energy thereby necessitating more fuel to be consumed than is necessary. This extra fuel use results in greater air emissions than is necessary. AB32 says that transmission line losses should be considered when accounting for greenhouse gas production in California. *See California Health and Safety Code section 38530(b) (2).* **(Please see our Section 29)**

a) The PSA didn't calculate the amount of extra electrical generation that will be necessary or the amount of greenhouse gases that will be created and spewed into the atmosphere next to Emerald Farms organic farming operations.

b) There was no evaluation of the impact of these emissions on Emerald Farms' crops or residential homes.

c) There was no attempt to find another power plant site on land already zoned for industrial uses and that is closer to the electrical load center.

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d) The CEC should not waive the NOI requirement of reviewing three alternate sites. The alternatives review should evaluate the total CO_2 and N_2O emissions of each site before granting a certification to the application for the Colusa Generating Station.

e) The presence of the power plant will diminish nearby property. See full details in section 29, pages 9 and 10.

2. The impacts on Biological Resources contain many errors. This topic is discussed in the comment letter by Dr. Shawn Smallwood. Attachment (1). Attachment (2) – Dr. Smallwood CV2.

3. Emerald Farms is opposed to the use of Emission Reduction Credits ("ERC") based on agricultural burning for the CGS air emissions offsets because of the demonstrated lack of compliance with the air quality permit conditions at the PG&E Delevan Compressor facility. The PSA addresses ERCs on page 4.1-40 acknowledging the problem of lack of offsets in the third quarter of each year, but states that the CEC staff thinks that VOC and NOX offsets on an annual basis should offset the damages.

   The Air Resources Board wrote a letter on June 12, 2007, stating that it did not consider VOC ERCs as offsets for NOX. The problem is that there is no guarantee that any of this will occur. The Colusa County Air Pollution Control District (CCAPCD) is responsible to enforce the Title V permit conditions, but they haven't retained any records for the Delevan Compressor Station. So, the power plant will also probably operate without oversight.

   Equally germane to the use of agricultural burning credits for the ERC's is the fact that farmers are not allowed to burn their residues on "no burn days". These "burn" or "no burn days" are determined each day based on the air quality in the area. This means there is no burning of agricultural residues when the air quality is determined to be poor. This period of "no burn days" sometimes goes on for a week or more. Our position would be that this generation plant would operate continuously regardless of the daily air quality, even on days that were determined to be unacceptable for agricultural burning.

   Obviously this facility would not shut down during these periods of poor air quality so this use of agricultural burn credits is totally unacceptable.

   Therefore, there should be no use of ERCs based on agricultural burning to meet emission requirements.

4. The power plant should be designed to reduce emissions to allowable levels. They are using duct burners inside the heat recovery steam generator. Using

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duct burners is inefficient. They should use an air derivative turbine instead. Air duct turbines is one change to the plant design that can help and it was not discussed in the PSA

5. The application, PDOC, FDOC, PSA or any other document in this case did not propose an emission limit for carbon dioxide, CO_2, or nitrous oxide, N_2O. The Supreme Court issued a decision[1] in April 2007 reversing EPA's ruling that carbon dioxide is not an air pollutant.

   The court said that 42 U. S. C. §7602 means that: "any air pollution agent . . . including any physical, chemical, . . . substance . . . emitted into . . . the ambient air . . . ," §7602(g) (emphasis added)—embraces all airborne compounds of whatever stripe. Moreover, carbon dioxide and other greenhouse gases are undoubtedly "physical [and] chemical . . . substance[s]." and "EPA identifies nothing suggesting that Congress meant to curtail EPA's power to treat greenhouse gases as air pollutants."

   This obviously has implications regarding the global warming issue. . It is not settled in the law at this point whether such a limit must be present in a United States Environmental Protection Agency Prevention of Significant Deterioration ("PSD") permit, but it is being litigated in other cases.

   Also, the type of burners planned for use will generate large amounts of N_2O. This is also a greenhouse gas (it is about 200 times worse than CO_2), though, as with CO_2, it is not clear that it is regulated under the Act.

6. The bridge for site access shouldn't be allowed because the land owners plan to live there and can't with the construction of the Colusa Generating Station. The land owners, the Barretts and Dirks, have always considered their land near the bridge area as the location for a home for them or their children.

   They would forever have to forgo that particular use of their property if the plant is built. The only mitigation for this deprivation is for the applicant to purchase the affected property.

7. The cumulative impacts of the Delevan Compressor Station and the Colusa Generating Station were not discussed in the application, the PDOC, the FDOC, the PSA or any other documents in this case. According to District regulations the Delevan Compressor Station and the CGS are one stationary source and should be evaluated as such. The PDOC should be reissued to comply with Colusa County Air Pollution Control District rules.

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[1] *Massachusetts, et al., Petitioners v. Environmental Protection Agency, et al.* (2007) *127 S. Ct. 1438; 167 L. Ed. 2d 248*

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There also may be an issue regarding the relationship between this facility and the existing PG&E facilities out there. That is, if the facilities are all considered the same source, then emission reductions at the existing PG&E facilities are required.

8. NOISE Studies – The PSA states that there is no way to eliminate noise from construction and operation of the power plant. Therefore, the applicant must purchase the affected property. Noise recording devices were placed in the site neighborhood to record natural background noise during April 2007, but the data was not provided and there was no discussion of it in the PSA.

   The PSA states that noise from the power plant cannot be eliminated, thus acknowledging that the residents will no longer be able to use their property as a home. The PSA did address the impacts on ML1 (Etchepare and neighbor's houses) and ML2 a southern Glenn County residence. The CEC staff determined that significant noise impacts would occur and recommended mitigation (solid core doors, insulation, dual pane glass, sound walls, etc.). and that is as far as they went.

   These mitigation measures will not make the site acceptable as a residence because these types of mitigations still prevent enjoyment of the outside quiet that currently exists or the ability of leaving windows open during mild times of the year. Also the residences' electricity consumption would soar because the residents would have to keep the air conditioning running even when the outside temperatures were mild enough to leave their windows open.

9. The NOx limit proposed in the application is too high. The proposed limit is 2 ppm with a 3 hour average. There is a sound basis for saying it should be a 1 hour average.

10. The emission limit for carbon monoxide is 3 ppm. The technology proposed can achieve a 1 ppm limit.

11. Aldehydes produced during startups were not addressed in calculating whether they are major for Hazardous Air Pollutants (HAPS) were not discussed in the application, the PDOC, the FDOC, the PSA or any other documents in this case. According to District regulations the Delevan Compressor Station and the CGS are one stationary source and should be evaluated as such for HAPS.

12. The CEC PSA also needs to look at the impact of the all of the emissions on Emerald Farms' crops. The impact of the proposed power plant on Emerald Farms crops was not discussed in the application, the PDOC, the FDOC, the PSA or any other documents in this case. A short, inaccurate paragraph on

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page 4.1-36 in the PSA appears to state that no analysis needs to be performed. However there is no scientific basis cited for this conclusion.

13. It appears that the modeling analysis was done improperly, but to be sure, an independent modeler would have to be hired to provide a totally independent model. The modeler should be paid for by the CEC but chosen and hired by the neighbors and businesses that will be affected by the power plant emissions. The PSA didn't review ozone modeling, even though the facility is near the Sacramento ozone non-attainment area. This is a serious error.

14. There's no discussion regarding use of Liquefied Natural Gas (LNG) in the application. The LNG issue could be very important. One problem with the environmental assessment for the Colusa Generating Station is that it is based on the chemical composition of currently available natural gas.

    However, the California Public Utilities Commission has approved the use of LNG in California. The problem is that LNG gas quality is not known; it can vary from ship-load to ship-load. Therefore, the environmental assessment for the CGS project is not accurate for the air quality, land use, agricultural impacts and biology sections.

    This is very relevant to the CGS because there are several proposals for building LNG terminals; the terminals proposed for Oregon would transport LNG into the pipeline used to supply the CGS power plant fuel: http://www.energy.ca.gov/lng/projects.html#oregon

    The cumulative impact of adding the CGS to the site adjacent to the PG&E Delevan Compressor Station ("Delevan") was not discussed. In addition, the chemical composition of the natural gas used as fuel by Delevan may change as a result of importing gas at new LNG terminals being proposed to be built in Oregon.

    Therefore the recorded emissions from Delevan may differ from those expected in future years. This issue was not discussed in the PSD permit submitted to the USEPA for the CGS project.

15. CCAPCD personnel met with CEC and CARB personnel while determining what the Preliminary Determination of Compliance (PDOC) would state, but wouldn't allow the participation of Emerald Farms, a recognized intervener operating a farm on the property next to the proposed site.

16. We are concerned that the PG&E Delevan Compressor Station, a gas compressor for the PG&E gas pipeline at the proposed site, has not been monitored for compliance. The Title V permit for the Delevan station requires

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reporting of exceedences of permit limits. These reports are supposed to be made to the CCAPCD, but no one at the CCAPCD has any records of the Delevan Station operation.

17. Emerald Farms has sent five different California Public Records Act requests to the CCAPCD and has received no records or files, just a copy of the Title V permit for it. Therefore, there will likely be no monitoring of the power plant operation either. Emerald Farms grows organic crops and needs the assurance that their crops will continue to be organic.

18. The proposed Colusa County electric generating plant and the impact that a 660-megawatt natural gas-fired, electric generating facility will have on regional air quality has not been properly addressed. More pollutants surely must be mitigated on an area wide basis, including Glenn, Butte, Sutter, Tehama, Nevada, Shasta (Federal non-Attainment) and Lake Counties.

In California Energy Commission (CEC) documents we read: "NOX and NO2 disperse on a regional scale into the Sacramento Valley Air Basin, & other reactants aid in and favor the formation of O3." This was not discussed in the PDOC, the FDOC, the PSA or any other documents in this case.

19. VOCs react and form reactive species. It is therefore a larger contributor to O3 formation on a regional scale. There is growing concern that nitric acid (HNO3) may also impact vegetation.

Emission reduction credits (ERCs) are mostly in Colusa County, with some mitigation in one other county, but no mitigation on a large scale. The winds carry the pollution everywhere. We also question whether or not there is an official bank for APCD Credits in Colusa County?

We believe that this actually results in poorer air quality over the entire region. And we question the validity of a lot of these banked credits. Many times these so called credits no longer valid, but the system continues as it has so we ask for firm verification that the credits listed in the PDOC, FDOC and PSA are valid, without question. There are no boundaries, it is common air.

20. The various nitrogen oxides (NOX) in the ambient air, only nitric oxide (NO) and nitrogen dioxide (NO2) have been considered important phytotoxicants; however, there is growing concern that nitric acid (HNO3) may also impact vegetation. None of this has been discussed in the PDOC, the FDOC, the PSA or any other documents in this case

21. The proposed siting of the **Colusa Generating Station (CGS)** and the impact that a 660-megawatt natural gas-fired, electric generating facility will have on

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adjacent counties, particularly where there is a distinct possibility, if not probability, that another or several other plants of the same size may be added to or near the same site in the future.

22. At the present time, there are no scientific studies determining to what extent these toxic, cancer-causing emissions may impact existing air pollution in the neighboring counties and particularly in regard to agricultural resources.

We do have expert opinions from highly qualified individuals that include scientists associated with the University of California, Davis that such a study is warranted and should be undertaken before the extent of the impacts can be properly determined and appropriate mitigation measure can be formulated and implemented.

23. The adjacent Delevan Compressor Station is owned and operated by PG&E who will own and operate the CGS. The Delevan Compressor Station is one of the largest emitters of NOx in Sacramento Valley. The Colusa Generating Station will emit 185 tons per year of NOx. According to the 2004 ARB almanac PG&E's Delevan Compressor station's emits 356 tons per year of NOx.

Together they will emit 541 tons of NOx per year on contiguous property owned by the same entity - PG&E. Colusa County has estimated NOx emissions of 7 tons a day according to the 2006 ARB Almanac. PG&E's CGS and the Delevan Compressor station combined will emit 1.49 tons per day of NOx which is 21.2% of the daily total NOx emissions in Colusa County - from one source.

The regional atmospheric reaction of O_3 precursor pollutants is a complex matter. Of particular interest is the contribution of VOCs in the generation of O_3. According to the U.S. EPA (2006b, p. AX2-5), "The oxidation of reactive VOCs leads to the formation of reactive radical species that allow the conversion of NO to NO_2 without the participation of O_3."

In simplified terms, VOCs react and form reactive species that allow the conversion of NO to NO_2 without reducing existing O_3 levels (which occurs in Reaction 3); hence, as NO_2 reacts to form O_3, an increase in O_3 concentrations occurs. **It is therefore a larger contributor to O_3 formation on a regional scale.**

Of the various nitrogen oxides (NOX) in the ambient air, only nitric oxide (NO) and nitrogen dioxide (NO_2) have been considered important phytotoxicants; however, **there is growing concern that nitric acid (HNO_3) may also impact vegetation**

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This is a regional problem which was not discussed in any of the CEC documents issued to date. However, it could have a serious impact on Glenn, Butte, Sutter, Nevada, Tehama, Shasta (Federal non-attainment) and Lake Counties, and therefore we believe that it must be fully discussed in these most important studies. To neglect the impacts on the Sacramento Air Basin is certainly shortsighted if not illegal. Sacramento County is a Federal non-attainment area.

24. These and many other facts are slowly coming to the fore, and the result is that the overall impact is far greater than has been revealed by E&L Westcoast, LLC, (E&LW or "Applicant") a subsidiary of Competitive Power Ventures and/or the California Energy Commission.

    E&LW is building this station for PG&E which has registered as an Intervener, which we find to be a rather strange action by PG&E. It is our observation that the PDOC, the FDOC, the PSA and other documents in this case are not sufficient.

25. In the Decision 06-11-048 - November 30, 2006 - BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA, Pacific Gas and Electric Company. PG&E explains, it does not have the in-house experience or expertise because it has not worked on siting issues with the California Energy Commission (CEC) or sited a power plant under CEQA for over 20 years, and based its estimate on discussions with environmental firms that routinely do this work.

    Perhaps this explains some of the problems that are obvious when one reviews the PDOC, FDOC and PSA. We believe that each one of these documents is deficient in many ways.

    The PUC document goes into great detail in discussing ratemaking for the capital costs of the Colusa project that would provide PG&E the opportunity to seek recovery of capital costs in excess of the adopted initial capital cost and wrote:

"In summary, we approve as reasonable and adopt the project bid price as the initial capital cost for the Colusa project, including the fixed contract price, excluding incentive payments, plus PG&E's estimated owner's costs, including owner's contingency. PG&E may not seek recovery of additional costs in excess of the project bid price, except that PG&E may apply for recovery of only those additional capital costs that PG&E may incur as a result of operational enhancements to the project.

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We direct PG&E to adjust the initial capital cost by advice letter filing to reflect any performance incentive payments actually made, and any performance incentive penalty actually due to it under the contracts. We direct PG&E to retroactively true up the initial capital cost in the next GRC following operation to reflect 50% of any savings relative to the initial capital cost."

In view of the paragraphs above and all other materials in these comments, we submit that there are serious problems with the siting of this power plant in Colusa County that have NOT been considered correctly, and we seriously question the validity of this process.

26. The Air Resources Board (ARB or Board) identified particulate emissions from diesel-fueled engines (diesel PM) as toxic air contaminants (TACs) in August 1998. Following the identification process, it is reasonable to eliminate the use of diesel engines wherever possible. The CGS is being sited next to a natural gas pipeline and natural gas use has significantly less particulate emissions. Therefore, the emergency power at the CGS should be natural gas fueled, not diesel fueled.

27. Emerald Farms Consultant Bob Sarvey has filed comments which are contained in Attachment (4) His CV is Attachment (5).

28. For the record, we address once again the issues of the very tardy filing and lack of timely notification the FDOC. Had it not been for the intervention of Bob Reynolds with the CEC on 6-25-07, who knows when Emerald might have received the FDOC. Bob sent the FDOC to Emerald at 8:40am, the Caswell letter and the FDOC came at 2:31pm. The deadline for filing comments is the 10th of July; someone withheld the FDOC from 6-11-07 to 6-26-07. That's 15 full days of very valuable lost time to Emerald Farms

    Why was the FDOC which was filed as received by the CEC on the June 11, 2007 not immediately posted? Why did it take until the 26th for it to be posted by the CEC? Why was page 43 of the FDOC revised twice after the FDOC was filed? What analyses were corrected? What additional data was found? Those questions we have asked of the CEC and the Colusa APCD and neither one has yet to provide a satisfactory answer.

29. The Etchepare Family owns land, 880 acres, that is only 6200 feet east of this project. This land is split into legal 40 acre parcels and could, under existing land use rules, be split into 10 acre parcels. The current value of agricultural land in this area is approximately $5000 per acre. Smaller parcels sell for premiums for use as rural home sites.

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The approximate value of a 10 acre parcel is currently $20,000 per acre. The location of this property makes it particularly valuable as it is serviced by the Delevan Road exit on I-5 and is merely 2 miles directly west of the I-5 freeway.

The Etchepare Family has always considered this location, and the fact the property is already split into 40 parcels, would be of considerable additional value at some future time when they retired and decided to sell.

The PSA clearly notes significant problems with visual issues and noise at ML1, residences in the middle of this property. Should the CGS be built the likelihood that full value for these parcels could be realized is greatly diminished. Even using $10,000 per acre for each of the 40 acre parcels the increase in value of the 880 acres is $4,400,000 over its value as agricultural land.

If, in the future, Colusa County in its new General Plan, should require a minimum of 40 acre parcels for rural home sites the value of these units would be greatly enhanced. Currently there is a strong demand for these smaller parcels in Colusa County.

The PSA and FSA should reflect these very real economics in evaluating the socioeconomic issues. CGS would be totally incompatible with the general attraction to rural properties as most buyers of these types of parcels are purchasing them to get away from urban pollution, noise and visual clutter.

Sincerely,

Allen Etchepare

Attachments:
(1) – Dr. Smallwood Comments (2) – Dr. Smallwood CV
(3) – Bob Sarvey Comments (4) – Bob Sarvey Declaration and Resume

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ATTACHMENT (1)

COMMENTS ON THE CEC'S PRELIMINARY STAFF ASSESSMENT OF THE COLUSA GENERATING STATION WITH A FOCUS ON BIOLOGICAL RESOURCES

Testimony of:

K. Shawn Smallwood, Ph.D.
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Presented to:

Siting Committee
California Energy Commission

August 18, 2007

I have been retained by Emerald Farms as an independent expert on environmental resources with focus on biological resources to review the Preliminary Staff Assessment (PSA) and relevant planning documents related to the Colusa Generating Station (CGS), which is proposed to be sited in the eastern foothills of northern Colusa County. My qualifications for commenting on the CGS planning documents are summarized in my Curriculum Vitae, which is attached. I have a Ph.D. in Ecology with >20 years of professional experience with wildlife issues involving agriculture, hazardous waste, and energy generation and transmission.

In the following text, I will summarize the following shortfalls that I found in the PSA prepared for the CGS. These shortfalls will cause excessive harm to the environment unless they are rectified. Briefly, the following problems with the environmental review are raised in my letter.

1. Adding 660-MW of natural gas-fired power generation to California's electric energy portfolio conflicts with the goal of 20% of California's power generation coming from renewable sources by 2010, as stated in the Energy Action Plan of 2003 and adopted by the CEC;

2. The piecemeal release of environmental documents prevented a comprehensive and maximally effective public review and participation with the planning process by forcing the public to obtain and crosswalk among all of the various documents in order to approach the level of understanding of the project that one would get from an EIR under CEQA;

3. The CEC is deferring formulation of multiple mitigation measures to the preparation of a Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP), the completion date of which has not been given, and which may prevent the public from participating with the crucial part of the project planning that is directed toward mitigation of project impacts;

4. The CEC staff should not be preparing the environmental review documents for the CGS because it is infusing into them its own ideations, which are naturally defended against public critique and which results in bias – the CEC staff should be critiquing the EIR-equivalent documents that are prepared by the applicant, but it should not be certifying its own planning documents;

5. The PSA did not indicate whether CEC staff visited the project site, which should make a difference when coming to conclusions about project impacts and recommending mitigation measures;

6. The PSA did not reveal how many years the Colusa Generating Station would operate, which is important information to anyone attempting to participate with the environmental review of this project;

7. The PSA was prepared and publicly circulated prematurely because the applicant has yet to secure a Section 404 permit from the US Army Corps of Engineers nor streambed alteration permits from California Department of Fish and Game;

8. The PSA was prepared and publicly circulated prematurely because protocol surveys have yet to be performed for endangered branchiopods suspected to live in the vernal pools known to be on the project site, and I have seen no evidence the applicant has consulted with the US Fish and Wildlife Service or the California Water Quality Control Board, which has jurisdiction over all waters of the state and may require additional or different mitigation;

9. The PSA was prepared and publicly circulated prematurely because CEC staff concluded additional cumulative impacts analysis needs to be performed on air resources (page 4.1-54);

10. Multiple special-status species were omitted from the impacts assessment, including golden eagle, white-faced ibis, white-tailed kite, merlin, prairie falcon, loggerhead shrike, and western spadefoot, and so the impacts assessment remains incomplete;

11. The only biological impact being compensated with a mitigation measure is the land conversion for the facility's footprint, thereby neglecting the impacts caused by atmospheric pollution and the annual removal of 126 acre-feet of water from an already stressed water budget;

12. The CEC did not consider atmospheric pollution as a significant impact to wildlife, and neglected to consider that the atmospheric pollutants generated by the CGS will deposit downwind onto habitat of California red-legged frog and California tiger salamander, both species of which are sensitive to these pollutants and threatened by exposure to them;

13. The CEC is apparently not requiring the applicant to use SCONOx technology, which has been demonstrated to achieve much reduced emissions, and because this improved technology is feasible, the CEC is not holding up to CEQA's foremost principle of maximizing environmental protections through feasible mitigation;

14. The cumulative impacts analysis was diminutive, and did not specify the temporal or spatial scales covered by the assessment;

15. The cumulative impacts analysis inappropriately neglected to include on-going impacts caused by existing generators of pollution and other on-going adverse impacts to wildlife caused by energy generation in and around the Central Valley; and,

16. The CEC dismissed Emerald Farms' concerns over the potential impacts of atmospheric pollutants on its organic farming operation, even though the CEC demonstrated no expertise on farming operations or how atmospheric pollutants may affect agricultural crops, let alone specialty crops grown by Emerald Farms.

SITE VISITS

I twice visited land close enough to the project site that I could view details of the site using binoculars. I last visited the site on 10 May 2007, and I had visited the area in 2001, as well. I also toured Emerald Farms twice in order to better understand its farming operations and the species of wildlife using the area.

SUFFICIENCY OF PSA AS AN INFORMATIVE DOCUMENT

As I have stated in my comment letters on other gas-fired power plant siting cases before the CEC, to make informed decisions, lead authorities and the public must have access to good information. Under CEQA[1], "[A] paramount consideration is the right of the public to be informed in such a way that it can intelligently weigh the environmental consequences of any contemplated action and have an appropriate voice in the formulation of any decision." Attributes of such information would include thoroughness, relevance, lack of bias, and honest, full disclosure of the environmental setting and possible cumulative impacts. While I'm sure CEC staff sought to provide all these attributes in the PSA, the CEC's policies on project review sometimes prevent thoroughness and full disclosure of cumulative impacts, and these policies result in unintentional bias. I will elaborate on my conclusions below.

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[1] Environmental Planning and Information Council vs. County of El Dorado (1982) 131 Cal. App. 3d 350, 354.

Piecemeal Document Release

For example, the CEC is making it difficult for me and Emerald Farms to participate with the planning and review processes of this power plant application. The typical CEQA process facilitates public participation by consolidating information for the public in an EIR or negative declaration. The CEC is atypical with respect to CEQA by scattering information about in data requests, responses to data requests, staff assessments, the application for certification, the BMRIMP and other documents. For example, as I will discuss below, the PSA repeatedly defers formulation of mitigation measures to the BRMIMP, which based on my experience with CEC power plant siting cases, will not be available until after the CEC's public process is concluded. This process frustrates those members of the public who want to participate. It discourages them from continuing. Please return to the CEQA process as it is intended to be used.

Agency Bias

Repeating my comment I've made on PSAs and FSAs for previously proposed gas-fired power plants in California, by writing planning documents that are later self-certified, the CEC is substituting its staff in the role normally played by project applicants under typical CEQA circumstances. It is natural for individuals to defend their ideations and their time and effort put into a planning document. It is only natural, therefore, for such individuals to defend against criticism of their product. And this is alright so long as the lead agency is truly independent of the applicant, and is acting in the role of weighing arguments between the applicant and interested parties who may disagree with the applicant on one or more points. The CEC's process, however, has CEC staff formulating impact assessments and mitigation measures as if it was the applicant, while all the time answering to the very body that will decide on certification of the planning document(s). CEC staff members are not "independent" analysts of the environmental documents prepared for the CGS, as claimed on page 1-1 of the PSA and elsewhere.

Based on my understanding of CEQA, I believe the CEC abandoned the CEQA process by not simply reviewing the planning documents prepared by the project applicant. By writing these assessments, and by recommending the mitigation measures later to be certified by the Commission, the CEC staff is more likely to treat public criticism as adversarial rather than constructive (and it does so at the expense of the taxpayers). Having been a peer-reviewer of many scientific papers submitted to professional journals, and having had many of my own papers reviewed by my peers, and having administered the reviews of numerous papers, I am experienced with the independent review process. The CEC staff members are not independent reviewers of proposed gas-fired power plants. My conclusion is corroborated by California PEER's review of the CEC staff and its internal process[2]. There is ample reason to argue that the

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[2] Karen Schambach, California PEER, Sept 12, 2001. Metcalf Energy Center Commission Consideration and possible approval of The Presiding Member's Proposed Decision (August 24, 2001). California Energy Commission Docket No. 99-AFC-3, http://www.peer.org/california/CA_PEER_Energy_Comm.html

CEC staff is not independent in power plant siting cases. I again request that the CEC return to its normal regulatory role pursuant to the principles of CEQA and that it cease preparations of staff assessments.

ENVIRONMENTAL SETTING

Did CEC staff visit the proposed project site? I cannot tell from the PSA whether staff visited the site. It would be helpful to know how long staff visited the site and what observation methods were used. This information is important because the public needs to be able to assess the degree to which staff made subsequent assessments based on personal knowledge of the site, or whether staff relied entirely on information provided by the applicant.

According to page 4.2-8, the site is annual grassland dominated by nonnative species typical of Central Valley grasslands degraded by grazing. Though I'm sure it was unintentional, this statement is a little misleading because Central Valley grasslands had been grazed for thousands of years and the plant species in these grasslands are adapted to grazing. It is not grazing, *per se*, that degraded Central Valley grasslands, but rather habitat fragmentation, the invasions of exotic species, altered fire regimes, and sometimes overgrazing by cattle. Regardless of the cause, however, this statement gives the impression CEC staff feels this grassland is of low value.

Removal of grazing from experimental plots at various grassland sites in California resulted in overwhelming growth of exotic annual grasses and the crowding out of native plants. For this reason the CEC's certified mitigation for the Metcalf Energy Center maintained grazing as a condition of the conservation easements. It is inconsistent of CEC staff to now conclude a grassland is degraded simply because it was grazed. If staff relied on some other evidence to come to the conclusion the site is degraded, then that evidence should be detailed in the PSA.

Furthermore, regardless of whether having been grazed, annual grasslands support some of the most diverse assemblies of plant and wildlife species in California,[3] many of which are threatened and endangered. Grasslands are widely known among biologists to be very important as foraging, nesting, and breeding habitat for a wide variety of wildlife species, not to mention the numerous species of wildlife that reside in grasslands, and has been shown to support high bird species richness compared to other vegetation types.[4] However, grasslands have been reduced in California from their original extent by about 90 percent, representing a tremendous and significant loss of plant and wildlife habitat. The California Native Plant Society believes that grasslands are rare locally, regionally, and statewide, especially considering the cumulative losses that have occurred in the past 150 years. Losing the grassland in the project site should be considered a significant impact, an EIR prepared and adequate mitigation provided.

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[3] Jones & Stokes Associates, Inc. 1989. Sliding Towards Extinction: Reassembling the Pieces. Sacramento, California. Commissioned by The Nature Conservancy, San Francisco, California.

[4] Jones & Stokes Associates, Inc. 1989.

The PSA identified only 7 special-status species of bird that could forage on the project site. Multiple species were omitted, including white-faced ibis, golden eagle, white-tailed kite, merlin, prairie falcon, short-eared owl, loggerhead shrike, and mountain plover. For a more complete list of the species potentially occurring on or using the project site, see Table 1.

According to the PSA (page 4.2-16), the only special-status species of amphibians that could conceivably occur on the project site were California red-legged frog and California tiger salamander. I concur with CEC staff it is unlikely either of these species occur in the area, but I disagree these are the only conceivable special-status species in the area. Foothill yellow-legged frog could occur onsite or nearby, as could western spadefoot and California newt.

IMPACTS ASSESSMENT

Shortfalls in describing the environmental setting can result in minimized estimates of environmental impacts, which has been the case with the FSA prepared for the Tesla Power Project. Also, as I explained in my letter on the East Altamont Energy Center, the CEC under-estimated impacts because its staff is constrained by arbitrary standards such as the six mile limit on cumulative impacts assessment and the dismissal of indirect impacts in favor of direct impacts, and too much reliance on the applicant's impacts assessment. The cumulative impacts assessment did not consider the air and water impacts of other built and approved gas-fired power plants in California's Great Central Valley. These other power plants together consume or will soon consume large volumes of water that would otherwise flow to agricultural crops and the San Joaquin Delta and other wetlands along the way. These other power plants together contribute or will contribute large amounts of criteria pollutants to the San Joaquin Air Basin, as well.

On page 4.1-36, CEC staff dismissed Emerald Farms' concern that sulfur emissions from the PG&E Delevan Compressor Station gas turbines may already be damaging specialty crops grown by Emerald Farms. Dismissing Emerald Farms' concern is inconsistent with the precautionary principal, which is the recommended environmental decision-making in the face of uncertainty.[5] Scientists have long recommended erring on the side of caution when making such conclusions. Both the Precautionary Principle and the consideration of Type II error[6] lead to

[5] O'Brien, M. 2000. Making better environmental decisions: an alternative to risk management. The MIT Press, Cambridge, Massachusetts. 283 pp.

[6] Shrader-Frechette, K.S., and E.D. McCoy. 1992. Statistics, Costs and Rationality in Ecological Inference. *Tree* 7: 96-99.

Table 1. Special-status species of wildlife potentially occurring in the vicinity of the proposed Colusa Generating Station.

Species	Status[a]	Location of potential impacts	Record[b]	Habitat (Mostly based on CWHR)	Addressed in PSA?
Vernal pool fairy shrimp *Branchinecta lynchi*	FT	on		Vernal pools	Yes, but no surveys performed
Vernal pool tadpole shrimp *Lepidurus packardi*	FE	on		Vernal pools	Yes, but no surveys performed
Conservancy fairy shrimp *Branchinecta conservatio*	FE	on		Vernal pools	Yes, but no surveys performed
California newt *Taricha torosa torosa*	CSC	on-site & downwind		Ponds, reservoirs, slow streams and uplands	No
California tiger salamander *Ambystoma californiense*	FT, CSC	downwind		Lasting rain pools in grasslands	Yes
Western spadefoot *Scaphiopus hammondii*	CSC	on-site & downwind		Temporary rainpools, vernal pools	No
Foothill yellow-legged frog *Rana boylei boylei*	CSC	downwind		Streams	No
California red-legged frog *Rana aurora draytonii*	FT, CSC	Unlikely		Streams with deep pools & cover along banks	Yes
Western pond turtle *Clemmys marmorata pallida*	CSC	downwind		Slow water streams and ponds	No
Giant garter snake *Thamnophis gigas*	FT, CT	downwind		Fresh emergent marsh, streams with cover	Yes
Coast horned lizard *Phrynosoma coronatum frontale*	CSC	on-site & downwind		Grassland	No
Ornate shrew *Sorex ornatus*	CSC	on-site & downwind		Freshwater marsh, meadows	No
Townsend's big-eared bat *Corynorhinus t. townsendii*	CSC	on-site & downwind		Most cover types in project area	Yes, but mitigation not recommended
Yuma myotis	CSC	on-site &		Ponds and streams	No

Myotis yumanensis		downwind			
Western red bat *Lasiurus blossevillii*	USFS	on-site & downwind		Annual grassland and cropland	No
Western mastiff bat *Eumops perotis californicus*	CSC	on-site & downwind		Annual grassland	No
Pallid bat *Antrozous pallidus*	CSC	on-site & downwind		Annual grassland	Yes, but mitigation not recommended
California kangaroo rat *Dipodomys californicus eximius*	CSC	on-site & downwind		Annual grassland	No
Ringtail *Bassariscus astutus*	CFP	downwind		Riparian forest	No
American badger *Taxidea taxus*	CSA	on-site & downwind		Annual grassland	No
Mountain lion *Puma concolor*	CFP, CSC	Improbable		All natural cover types	No
Pronghorn *Antilocapra americana*			URS	Annual grassland	No
American white pelican *Pelecanus erythrorhynchos*	CSC	downwind		Lakes and reservoirs	No
Double-crested cormorant *Phalacrocorax auritus*	CSC	downwind	SS	Large streams, lakes and reservoirs	No
Least bittern *Ixobrychus exilis*	CSC	downwind		Fresh emergent vegetation	No
Great blue heron *Ardea herodius hyperonica*	CSA, CDFS	on-site & downwind	SS	Wetlands, reservoirs, cropland, annual grass	No
Great egret *Ardea alba*	CSA, CDFS	on-site & downwind	SS	Wetlands, reservoirs, cropland, annual grass	No
Black-crowned night heron *Nycticorax nycticorax*	CSA	on-site & downwind		Wetlands & cropland	No
White-faced ibis *Plegadis chihi*	CSC	on-site & downwind	URS	Fresh emergent wetland, cropland, annual grassland	Yes, but mitigation not recommended
Aleutian Canada goose *Branta candensis leucopareia*	FT	downwind		Fresh emergent marsh, reservoirs	No
Osprey *Pandion heliaetus carolinensis*	CSC	downwind		Large streams, ponds, lakes and reservoirs	Yes, but mitigation not recommended

White-tailed kite *Elanus leucurus*	CFP	on-site & downwind		Riaprian areas, grasslands, and wetlands	Yes, but mitigation not recommended
Northern harrier *Circus cyaneus*	CSC	on-site & downwind	URS, SS	Grasslands, wetlands, croplands	Yes, but mitigation not recommended
Bald eagle *Haliaeetus leucocephalus leucocephalus*	FT, CE	downwind		Lakes and reservoirs	Yes, but mitigation not recommended
Sharp-shinned hawk *Accipiter gentilis atricapillus*	CSC	downwind		Riparian and woodland forests	No
Cooper's hawk *Accipiter cooperii*	CSC	downwind		Riparian and woodland forests	No
Swainson's hawk *Buteo swainsoni*	CT	on-site & downwind	SS	Grasslands, wetlands; riparian forests, large trees	Yes
Ferruginous hawk *Buteo regalis*	CSC	on-site & downwind		Annual grassland	Yes, but mitigation not recommended
Golden eagle *Aquila chrysaetos canadensis*	CSC, CFP	on-site & downwind		Annual grassland	Yes, but mitigation not recommended
Merlin *Falco columbarius bendirei*	CSC	on-site & downwind		Annual grassland and wetlands	No
Peregrine falcon *Falco pergrinus*	FE, CE	on-site & downwind		Marshes	No
Prairie falcon *Falco mexicanus*	CSC	on-site & downwind	SS	Annual grassland	No
Greater sandhill crane *Grus canadensis tubida*	CT, CFP	on-site & downwind		Cropland, lacustrine, annual grassland, wetland	No
Long-billed curlew *Numenius americanus*	CSC	on-site & downwind		Cropland, lacustrine, annual grassland	No
Baird's sandpiper *Calidris bairdii*	CSC	on-site & downwind		Mudflats along pools, ponds and lakes.	No
Mountain plover Charadrius montanus	CSC	on-site & downwind		Annual grassland and plowed fields	No
California gull *Larus californicus*	CSC	downwind	SS	Freshwater lacustrine	No
Black tern	CSC	on-site &		Forages over wetlands	No

Chlidonias niger		downwind			
Western burrowing owl *Athene cunicularia*	CSC	on-site & downwind	URS, SS	Annual grassland	Yes
Long-eared owl *Asio otus*	CSC	on-site & downwind		Annual grassland	No
Short-eared owl *Strix occidentalis occidentalis*	CSC	on-site & downwind		Annual grassland	No
Loggerhead shrike *Lanius ludovicianus*	CSC	on-site & downwind	SS	Annual grassland, cropland	Yes, but mitigation not recommended
California horned lark *Eremophila alpestris actia*	CSC	on-site & downwind	URS	Annual grassland	Yes, but mitigation not recommended
Purple martin *Progne subis*	CSC	on-site & downwind		Migrates through grasslands and wetlands	No
Bank swallow *Riparia riparia*	CT	on-site & downwind		Nest in stream bank cliffs; forage over water, grasslands	Yes, but mitigation not recommended
Tricolored blackbird *Agelaius tricolor*	CSC	downwind		Might nest in the riparian vegetation south of the project site, especially in canal at Emerald Farms	Yes, but mitigation not recommended

[a] FE = Federal Endangered, FT = Federal threatened, CE = California Endangered, CT = California threatened, CFP = California Fully Protected, CSC = California Department of Fish and Game listing of California Species of Concern, CSA = California Special Animal, CDFS = California Department of Forestry sensitive.

[b] Identified as present on the project site or in the vicinity by URS or SS (Shawn Smallwood)

conclusions that represent the highest standards of professional environmental assessment.[7] The National Research Council also advocates for this approach when faced with uncertainty.[8] Furthermore, Emerald Farms is expert with cropping systems and crop disease, especially with crops it grows, whereas the CEC staff is not

On page 4.1-37, CEC staff proposed the applicant mitigate its project air impacts by purchasing Emission Reduction Credits (ERCs). I must point out, however, that banked ERCs do not minimize the impacts of air emissions on Emerald Farms. If the CEC staff analysis is incorrect about impacts to Emerald Farms, then the ERCs will not mitigate the error because they will have no direct affect on air emissions from the Colusa Generating Station.

CEC staff concluded an additional cumulative impacts analysis needs to be performed on air resources (page 4.1-54), so I am left wondering why the PSA was distributed before that analysis is complete. It is my understanding that the public, under CEQA, should have access to sound information about the project. Deferring additional analysis to an unspecified future date effectively removes the public from the CEQA review process.

The PSA did not identify the planned life of the project, and on page 4.2-21 the PSA gives the impression CEC staff also have no idea how long the applicant plans to operate the CGA. In my experience with power plant siting cases, it is unusual to not identify the operational life of the project. Neglecting to inform the public how long the project will operate also denies the public the opportunity to assess how long the project's impacts will continue, to consider project alternatives, and to formulate appropriate mitigation measures; this omission denies the public the opportunity to participate with a key aspect of the project.

I disagree with CEC staff when he says transmission lines and towers can electrocute large birds (page 4.2-20). Transmission lines and towers in California do not electrocute birds because the phase conductors are too far apart. Instead, electrocutions occur on electric distribution lines and supporting poles, where phased and grounded elements are in much closer proximity. I agree, however, that transmission lines should be constructed to meet APLIC standards.

The PSA did not address the project's potential impacts to most of the species in Table 1. The impacts to only a few of these species were discussed, minimally, and the impacts to the rest of the species were not mentioned. Also, the impacts discussed consisted mainly of construction impacts and habitat displacement from the laydown area. CEC staff considered potential impacts from increased vehicle traffic, but only for giant garter snakes (page 4.2-17).

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[7] Smallwood, K.S., A. Gonzales, T. Smith, E. West, C. Hawkins, E. Stitt, C. Keckler, C. Bailey, and K. Brown. 2001. Suggested standards for science applied to conservation issues. Transactions of the Western Section of the Wildlife Society 36:40-49.

[8] National Research Council. 1986. Ecological knowledge and environmental problem-solving: concepts and case studies. National Academy Press, Washington, D.C.

Water use

The biological and agricultural impacts of water use by the CGS and other proposed gas-fired power plants have been neglected by the CEC. Few would disagree that water is limited in California, and whatever amount of water is used for one purpose is often made unavailable for other uses – there is a water budget from which extractions have consequences to other users of the budget.

The CGS is to be commended for proposing dry cooling, which would require much less water per year than conventional gas-fired power plants, and compared to most of the gas-fired plants that have been permitted in California. There is still an impact, however, and it has not been addressed. The CEC concluded the CGS will use 126 acre-feet of water per year. Assuming the average agricultural crop in the Sacramento Valley uses 4 acre-feet of water per year, then the CGS would take the water that would have been used for production of 31.5 acres of agricultural crops. Or, the water will be denied elsewhere in the budget, such as from wildlife habitat. Mitigation is needed for this impact.

Atmospheric Pollution Impacts on Biological Resources

On page 4.2-15, the PSA neglected consideration of the potential effects of atmospheric pollutants on biological resources. There was no consideration of the potential effects from VOCs or PM_{10} on special-status branchiopods, which the applicant assumed are present in the vernal pools. These impacts should have been assessed because there the Colusa Generating Station is projected to produce atmospheric pollutants in proportion to the power generating capacity of the project (Figures 1-6). Whereas dry-cooling technology is a vast improvement over previously proposed and permitted gas-fired power plants in California, Figures 1-6 demonstrate there is nothing special about this project when it comes to the generation of atmospheric pollutants.

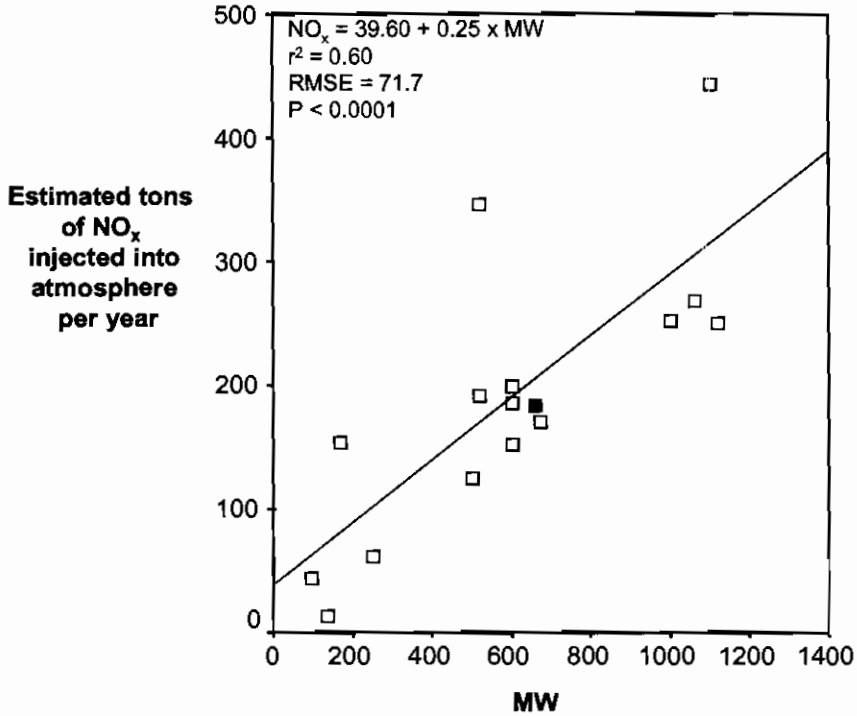

Figure 1. Annually, the CGS (solid symbol) will generate NO_x in an amount close to the trend among gas-fired power plants recently proposed or permitted in California. The power plants shown in this and the following graphs are all gas-fired and rely on fresh water for cooling. [9]

[9] Data in graphs represent Colusa Generating Station, Blythe Energy Project, Blythe Energy Project II, Metcalf Energy Center, Tracy Peaker Project, Tesla Power Project, Avenal Energy Project, Central Valley Energy Center, Palomar Energy Project, Russell City Energy Center, Cosumnes Power Plant, Inland Empire Energy Center, City of Vernon Malburg Generation Station, Magnolia Power Plant Project, East Altamont Energy Center.

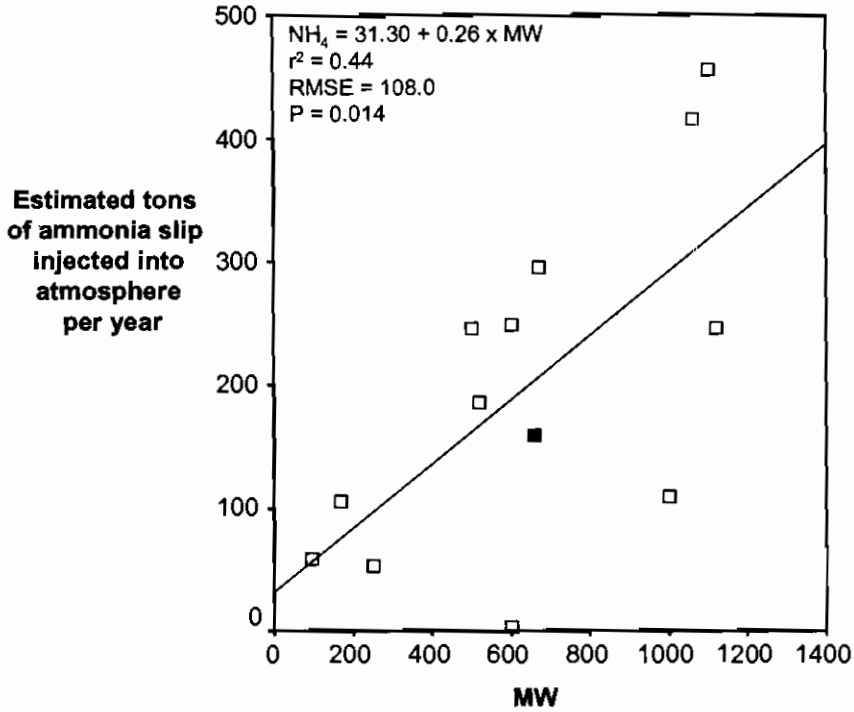

Figure 2. Annually, the CGS (solid symbol) will generate ammonia slip in an amount close to the trend among gas-fired power plants recently proposed or permitted in California.

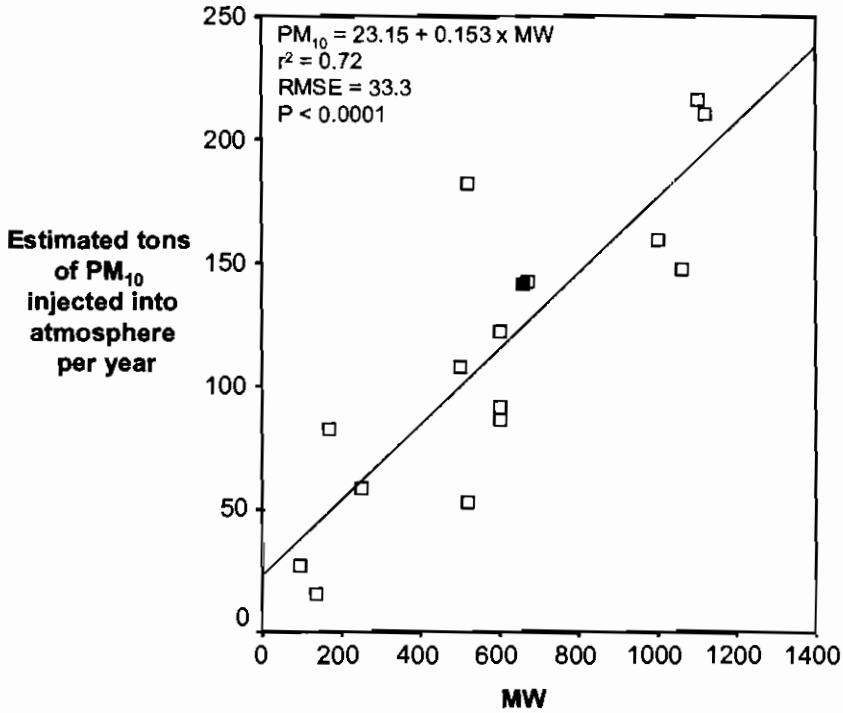

Figure 3. Annually, the CGS (solid symbol) will generate PM_{10} in an amount close to the trend among gas-fired power plants recently proposed or permitted in California.

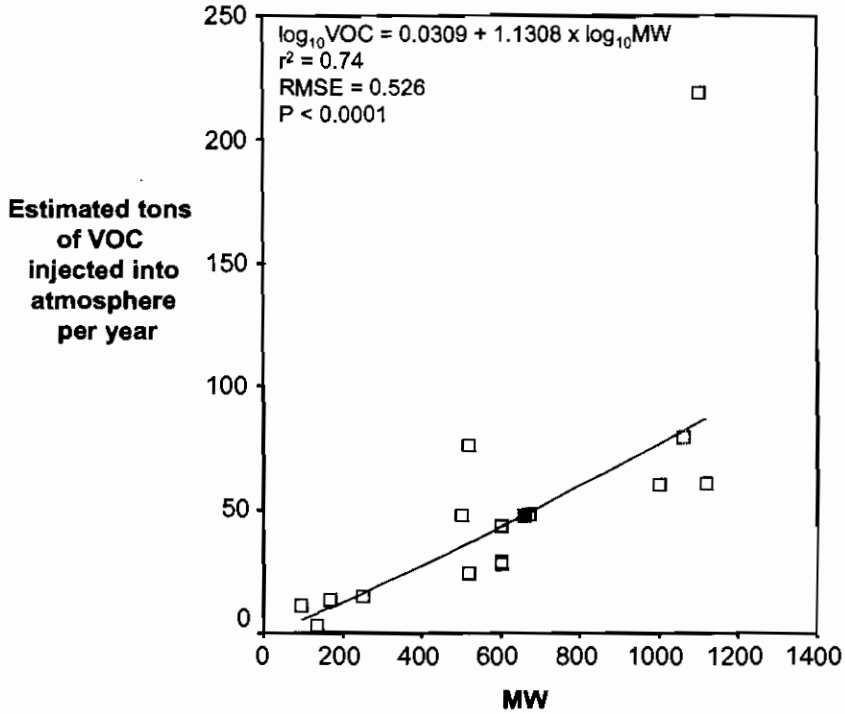

Figure 4. Annually, the CGS (solid symbol) will generate VOCs in an amount close to the trend among gas-fired power plants recently proposed or permitted in California.

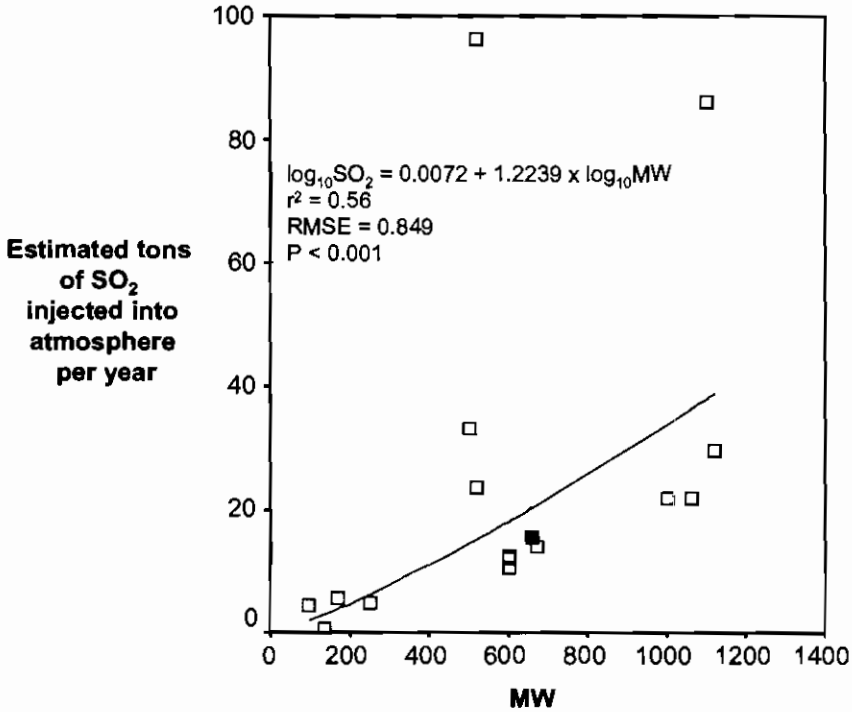

Figure 5. Annually, the CGS (solid symbol) will generate SO_2 in an amount close to the trend among gas-fired power plants recently proposed or permitted in California.

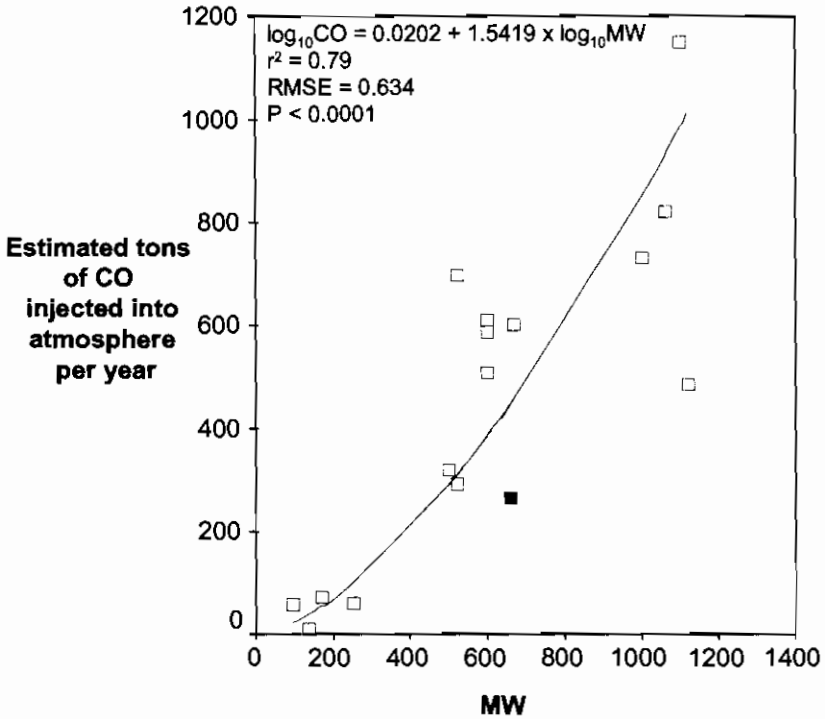

Figure 6. Annually, the CGS (solid symbol) will generate CO in an amount close to the trend among gas-fired power plants recently proposed or permitted in California.

Atmospheric pollutants are known to kill and injure wildlife. For example, upwind applications of pesticides correlate spatially with the extirpations of the threatened California red-legged frog[10], and the CGS would contribute air pollutants that are considered as threats to the continued survival of the California red-legged frog in the wild.[11] Pesticide uses associated with the project may be a problem, as pesticide applications have caused many poisoning deaths of raptors.[12] Acid rain has been documented to directly and indirectly harm multiple wildlife species and their habitats, and to cause adverse impacts to the ecosystem.[13] There is a growing body of evidence that exposures to NO_x, PM_{10}, and ammonia are hazards to amphibious species, and that ongoing rates of NO_x deposition might contribute to the declines of these species.[14] Nitrogen oxide

[10] Davidson, C., H. B. Shaffer, and M. R. Jennings. 2001. Declines of the California red-legged frog: climate, UV-B, habitat, and pesticides hypotheses. Ecological Applications 11:464-479.

[11] USFWS (U.S. Fish and Wildlife Service). 2002. Recovery plan for the California Red-legged Frog (*Rana aurora draytonii*). http://sacramento.fws.gov/es/documents/crf_recovery_plan.pdf

[12] Mineau, P., et al. (10 additional authors). 1999. Poisoning of raptors with organophosphorus and carbamate pesticides with emphasis on Canada, U.S. and U.K. J. Raptor Research 33:1-37.

[13] Longcore, J. R., H. Boyd, R. T. Brooks, G. M. Haramis, D. K. McNicol, J. R. Newman, K. A. Smith, and F. Stearns. 1993. Acidic depositions: effects on wildlife and habitats. Wildlife Society Technical Review 93-1, 42 pp.

[14] U.S. Fish and Wildlife Service. 2002. Recovery plan for the California Red-legged Frog (*Rana aurora draytonii*). http://sacramento.fws.gov/es/documents/crf_recovery_plan.pdf

emissions have degraded the grassland habitats by fertilizing them, hence facilitating their invasion by exotic plants and threatening multiple special-status species with regional extirpation should NO_x levels increase.[15] The CEC should be concerned not only with the wildlife that might inhabit the laydown area, but also with all of the animals and plants that will be exposed to these pollutants 24 hours per day, every day at every location where the pollutants will drift and deposit.

The atmospheric pollutants generated by the CGS also pose direct threats to amphibians downwind of the CGS, including to the California red-legged frog,[16] which occurs south of the proposed CGS, and which used to occur in a recovery unit to the west. As I have pointed out in my previous letters to the CEC on proposed power plants, the area of impact will be much larger than the 31-acre laydown area, so the proposed mitigation measures are insufficient. In reality, thousands of acres of special-status species habitats will be degraded by the atmospheric pollution created by the CGS. Scientific evidence supports my conclusion in general, and where it falls short in particulars, the precautionary principle, which was articulated and brought to the public's attention by leading scientists, should be applied.

Cumulative Impacts Assessment

The cumulative impacts analysis in the PSA was diminutive. The very fact special-status species occur in the area is an indication of significant cumulative impacts. It is important to recognize that nearly all special-status species have been so designated because they have declined due to cumulative impacts. That is, *the list of special-status species is evidence that cumulative impacts have already occurred.* However, CEC staff provided no technical basis in support of his statement that he "does not believe that the CGS will contribute significantly to cumulative impacts to biological resources in the region." The PSA did not present a cumulative impacts analysis directed toward biological resources.

According to the National Research Council (1986),[17] cumulative environmental effects can be defined as:

- Time-crowded perturbations, in which perturbations are so frequent that the effects of one have not dissipated prior to the next perturbation;
- Space-crowded perturbations, in which the effects overlap spatially;
- Synergisms, in which reactions between different types of perturbations cause qualitatively and quantitatively different ecological responses; and,

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[15] Weiss, S. 1999. Cars, cows, and checkerspot butterflies: nitrogen deposition and management of nutrient-poor grasslands for a threatened species. Conservation Biology 13:1-12.

[16] U.S. Fish and Wildlife Service (2002)

[17] National Research Council. 1986. Ecological knowledge and environmental problem-solving: concepts and case studies. National Academy Press, Washington, D.C.

- Incremental and decrimental effects, in which the functional integrity of the species or resource at issue is eroded.

None of these types of cumulative impacts were addressed in the Colusa Generating Station PSA.

To perform a quantitative, cumulative impact assessment for each species, the thresholds of significance need to be established, along with margins of safety around these significance thresholds[18]. In the scoping phase of cumulative effects analysis, the environmental review document needs to identify the temporal and spatial scales of the assessment. The temporal scale should be set by the recovery time of the species or other environmental resources at issue (e.g., resources upon which the special-status species depend). According to Smallwood et al. (1999)[19], the cumulative effects analysis should extend over the amortized life of the project or the permit duration, and should consider how long the types of project impacts generally last. In the case of the CGS, the PSA established no thresholds of significance other than reciting the vague definition of cumulative impacts in the CEQA Guidelines. The PSA did not define the temporal or spatial scales used, nor did it consider how long the impacts may last.

The spatial scale should be set by the ecological process that is most critical to the species or resource at issue. The most common method for establishing the minimum spatial scale for cumulative effects assessment is to identify and delineate the watershed as the area within which to consider cumulative impacts.[20] In the case of the Colusa Generating Station, it might have been appropriate to establish the Great Central Valley as the appropriate spatial scale for analysis because the CGS contributes additional demand on water, which is a limiting resource in the Valley, and because the CGS will further pollute the atmosphere in the Valley. However, the PSA did not define the spatial scale of analysis.

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[18] MacDonald, L. H. 2000. Evaluating and managing cumulative effects: Process and constraints. Environmental Management 26:299-316.

[19] Smallwood, K.S., J. Beyea and M. Morrison. 1999. Using the best scientific data for endangered species conservation. Environmental Management 24:421-435.

[20] Bedford, B. L. and E. M. Preston. 1988. Developing the scientific basis for assessing cumulative effects of wetland loss and degradation on landscape functions: status, perspectives, and prospects. Environmental Management 12:751-771;

Reid, L. M. 1998a. Chapter 19. Cumulative watershed effects and watershed analysis. Pages 476-501, in: Naiman, Robert J., and Robert E. Bilby, eds. River Ecology and Management: Lessons from the Pacific Coastal Ecoregion. Springer-Verlag, N.Y.;

Reid, L. M. 1998b. Cumulative watershed effects: Caspar Creek and beyond. In: Ziemer, Robert R., technical coordinator. Proceedings of the conference on coastal watersheds: the Caspar Creek story, 1998 May 6; Ukiah, California. General Tech. Rep. PSW GTR-168. Albany, California: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture; 117-127.

Bedford and Preston (1988)[21] maintained that the ecological system, rather than the project footprint, should set the bounds of the cumulative impacts analysis. They argued that all the projects and activities affecting the resource at issue should be considered within the watershed, landscape or region in which the resource's formation, distribution and biogeochemistry are meaningful. According to MacDonald (2000)[22], a cumulative effects analysis should also identify options for modification, mitigation, planning, and restoration within the plan area. It should also identify key data gaps and monitoring needs. It was unclear whether the Colusa Generating Station PSA performed any of these steps.

The project and similar projects in and around the Central Valley will likely have substantial and significant adverse impacts on wildlife in and around the Valley due to degraded air quality and less water flowing to wetlands. Yet, the Colusa Generating Station PSA did not use available methods to evaluate the cumulative impacts of the project on biological resources.

No consideration was given to the potential effects of atmospheric pollution deposition on the nearby federal and state wildlife refuges, such as Sacramento National Wildlife Refuge, Delevan National Wildlife Refuge, Colusa National Wildlife Refuge, and Gray Lodge Waterfowl Management Area. Colusa County is already considered non-attainment-transitional for ozone and non-attainment for PM_{10} under state standards, and CEC staff estimates the normal operations of the CGS will further exceed standards for PM_{10} and $PM_{2.5}$ emissions. CEC staff also found cumulative 1-hour NO_x impacts will exceed federal standards and will be significant, although this conclusion appeared to have omitted the fact that the adjacent Delevan Compressor Station is on record at the Air Resources Board as generating 220 tons of NO_x per year. Given these air quality impacts, along with the CGS's water demand of 126 acre-feet per year, I expected that the CEC would assess the project's impacts on the nearby wildlife refuges as well as on wildlife in the area.

Another omission in cumulative impacts assessments appearing in the PSA is the consequence to the Renewable Portfolio Standard (RPS) resulting from building yet another gas-fired power plant in California. In 2003 the CEC joined with other state agencies in adopting the Energy Action Plan, which accelerated the RPS goal of achieving 20% of California's electric energy generation from renewable sources by 2017 to doing so by 2010. In 2006, renewable energy generation comprised 10.9% of California's electric energy portfolio, whereas gas-fired generation comprised 41.5%.[23] The Energy Action Plan targeted an increase of 600 MW per year of new renewable power generation to meet the accelerated RPS goal, and my calculation indicates renewable power generation would need to nearly double between 2006 and 2010, while other forms of generation remain unchanged, in order for the accelerated RPS goal to be met. Adding 660 MW of gas-fired generation would make it all the more difficult for California to realize the RPS goal by 2017, let alone by 2010. The PSA should address this dilemma.

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[21] Bedford and Preston (1988)

[22] MacDonald, L. H. 2000. Evaluating and managing cumulative effects: Process and constraints. Environmental Management 26:299-316.

[23] According to the 2006 Net System Report, CEC-300-2007-007.

MITIGATION MEASURES FOR IMPACTS TO BIOLOGICAL RESOURCES

I do not understand why SCONOx technology is not recommended by CEC staff. SCONOx technology was not even mentioned in the PSA. It has been shown to substantially reduce the emissions of NO_x, NH_4, PM_{10}, VOC, SO_2, and CO during normal power plant operations.[24] It appears to be feasible, and would substantially lessen the project's impacts on the environment, so I don't understand why SCONOx technology is not under consideration.

According to CEC staff (page 4.2-14 and elsewhere in the PSA), multiple permits have yet to be obtained, such as streambed alteration permits from California Department of Fish and Game (CDFG) and a Section 404 permit from the US Army Corps of Engineers (USACE). CEC staff states that its Conditions of Certification includes the incorporation of the terms and conditions of these permits into the BRMIMP. As I have stated in previous comment letters to the CEC on the permitting of gas-fired power plants, this process excludes the public from participating with the formulation of the mitigation plan, which is a very important aspect of CEQA.

According to the PSA (page 4.2-10), the applicant has proposed performing additional pre-construction surveys for Swainson's hawk nests within 1 mile of the project site. These surveys would have to be performed during spring 2008, which is when Swainson's hawk will next breed in the area.

I agree with CEC staff recommendation for at least 25 acres of Swainson's hawk habitat conservation to mitigate the permanent destruction of existing habitat due to the power plant's total physical footprint (page 4.2-11). However, CEC staff did not address the impacts to Swainson's hawk due to the emissions of atmospheric pollution and water use. There is no plan offered or proposed to mitigate these impacts.

I concur with CEC staff that the mitigation measures listed on page 4.2-12 will adequately minimize impacts to vernal pools and vernal pool grassland north/northeast of site due to construction operations. However, normal power plant operations could adversely affect these vernal pools by depositing atmospheric pollutants on them.

I concur with CEC staff recommendations on increasing the extent of giant garter snake habitat to be conserved in exchange for the habitat area directly affected by the project (page 4.2-18).

Conditions of Certification

Below I comment on the staff recommendations for conditions of certification.

BIO-1 I agree with CEC staff regarding the identification of the designated biologist.

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[24] NOx abatement technology for stationary gas turbines. White paper, 15 pp. Docket Log No. 26677 under Prehearing testimony on Air Quality on East Altamont Energy Center, docketed 9/17/02.

BIO-2 I disagree the duties of the designated biologist should be detailed in the BRMIMP to be prepared at some unspecified later date. Doing so defers the formulation of this mitigation measures in a manner that disallows the public from participating pursuant to CEQA. All the duties and specifications of the designated biologist should be included in an environmental review document the public can access and comment upon within a reasonable time period prior to any certification decision by the CEC.

BIO-3 I agree with CEC staff that the designated biologist should submit the resume of the proposed biological monitor(s), but I think the minimum qualifications of these monitors should be specified in an environmental review document the public can access and comment upon within a reasonable time period prior to any certification decision by the CEC.

BIO-4 I agree with CEC staff on the duties of the biological monitors to report findings of biological impacts and to affect project construction or operations to halt or reduce the impacts.

BIO-5 I agree with CEC staff on the designated biologist's preparation of the WEAP.

BIO-6 I disagree the BRMIMP should be prepared at some unspecified later date. Doing so defers the formulation of the mitigation measures in a manner that disallows the public from participating pursuant to CEQA. The BRMIMP is obviously a major part of the mitigation plan, including the description of all biological monitoring methods, mitigation performance standards, and revegetation and restoration methods.

BIO-7 Measures addressing biological resources affected by project closure should be described in an environmental review document accessible by the public, not some exclusive plan to be described at an unspecified, later date.

BIO-8 The terms and conditions of any permits required from regulatory agencies should be detailed in an environmental review document accessible to the public, not some exclusive plan to be described at an unspecified, later date. All regulatory permits from resource agencies should be acquired prior to a CEC decision on certification.

BIO-9 The terms and conditions of the Streambed Alternation Agreement should be detailed in an environmental review document accessible to the public, not some exclusive plan to be described at an unspecified, later date. All regulatory permits from resource agencies should be acquired prior to a CEC decision on certification.

BIO-10 The terms and conditions of the Regional Water Quality Control Board section 401 water quality certification should be detailed in an environmental review document accessible to the public, not some exclusive plan to be described at an unspecified, later date. All regulatory permits from resource agencies should be acquired prior to a CEC decision on certification.

BIO-11 The terms and conditions of the USFWS section 7 Biological Opinion should be detailed in an environmental review document accessible to the public, not some exclusive plan to be described at an unspecified, later date.

BIO-12 The terms and conditions of the USACE section 404 permit should be detailed in an environmental review document accessible to the public, not some exclusive plan to be described at an unspecified, later date.

BIO-13 I generally agree with CEC staff, though I think staff neglected mitigation for the effects of atmospheric pollutants deposited by the power plant. Also, the details staff recommends be provided in the BRMIMP need to be presented in an environmental review document accessible to the public sufficiently in advance of the CEC's certification decision that they can meaningfully participate with the formulation of appropriate mitigation measures.

BIO-14 I agree with CEC staff, but again the information staff recommends be put into the BRMIMP needs to be presented in an environmental review document accessible to the public sufficiently in advance of the CEC's certification decision that they can meaningfully participate with the formulation of appropriate mitigation measures.

BIO-15 I agree with CEC staff on burrowing owl impacts avoidance measures.

BIO-16 I agree with CEC staff on giant garter snake mitigation measures.

BIO-17 I disagree a mitigation plan for construction activities at Teresa Creek should be developed at some unspecified later date. Deferring the formulation of the mitigation plan excludes the public from participating with it pursuant to CEQA.

BIO-18 I disagree a mitigation plan for revegetation and restoration should be developed at some unspecified later date. Deferring the formulation of the mitigation plan excludes the public from participating with it pursuant to CEQA.

BIO-19 Rather than "replacing" the wetland habitat in a conservation bank, I recommend purchasing conservation easements on wetlands that are privately held and conceivably in jeopardy of conversion to some land use that is incompatible with the persistence of the wetlands. Purchasing credits in a mitigation bank does not "replace" any habitat. Replacing wetlands through habitat creation is well known to be unsuccessful and ineffective.[25] A recent review of wetland creation as mitigation in southern California reported only 16 to 20% of the projects and their acreages, respectively, to be successful in biological terms.[26] This level of success, or rather failure, is strong grounds for not using wetland creation as a mitigation measure.

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[25] Zedler, J. B., and J. C. Callaway. 1999. Tracking wetland restoration: do mitigation sites follow desired trajectories? Restoration Ecology 7:69-73.

[26] Sudol, M. F., and R. K. Ambrose. 2002. The US Clean Water Act and habitat replacement: evaluation of mitigation sites in Orange County, California, USA. Environmental Management 30:727-734.

The Wildlife Society[27] accepted wetland creation as a form of mitigation only if the following conditions apply: (1) Creation of similar types of wetland in the region has been successful and documented; (2) The project proponent funds research on other similar wetlands in the region in order to learn how to most effectively create wetlands; (3) Only competent biologists are used; (4) The project proponent funds long-term monitoring to ensure that the created wetland is functioning properly and is self-perpetuating; and (5) The project proponent provides an irrevocable trust for long-term funding of management of the wetland. The PSA offered no evidence that creation of similar types of wetlands have been successful in the region, nor did it demonstrate that the project applicant has funded any research of wetlands in the region, nor did it promise that competent biologists would be used, nor did it propose funds for long-term monitoring to ensure proper function, nor did it offer an irrevocable trust fund for monitoring and management of the created wetlands. None of The Wildlife Society's criteria were met by the PSA.

Wetland creation as a mitigation measure is the type of measure that requires rigorous standards, given its poor track record. CNPS[28] and CDFG[29] insist that the mitigation design, implementation measures, and reporting methods be clearly documented, along with who or which agencies are responsible for achieving clearly defined success criteria. Assurances must be provided in writing that certain performance criteria of the mitigation plan will be realized, and guaranteed by a negotiable performance security large enough to complete the mitigation and to pursue alternative mitigation measures should the implementation be incomplete or the objectives fail to be achieved. Fifteen years of monitoring the success of the mitigation should be the minimum time period before returning the performance security. The PSA provided none of the details identified in this paragraph.

BIO-20 I agree with CEC staff, though I recommend adding mitigation for the potential effects of the generation of atmospheric pollutants by the power plant.

BIO-21 I disagree with CEC staff that the terms and conditions of the National Marine Fisheries Service section 7 Biological Opinion should be detailed in the BRMIMP. These terms and conditions should be detailed in an environmental review document

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[27] Hammer, D. A., R. D. Crawford, A. H. Huffman, D. B. Inkley, M. C. Landin, J. S. Larson, J. A. McGlincy, R. E. Stewart, Jr., R. Stromstad, M. W. Weller, and D. E. Wesley. 1994. Mitigation banking and wetlands characterization: the need for a national policy on wetlands. Wildlife Society Technical Review 94-1, 25 pp.

[28] California Native Plant Society. 1998. Mitigation guidelines regarding impacts to rare, threatened, and endangered plants. California Native Plant Society. http://www.cnps.org/archives/mitigation2.htm.

[29] California Department of Fish and Game. 1997. Guidelines for assessing the effects of proposed developments on rare, threatened, and endangered plants and plant communities. California Department of Fish and Game, Sacramento.

accessible to the public, not some exclusive plan to be described at an unspecified, later date.

MITIGATION MONITORING

It has long been known that mitigation pursuant to CEQA has often either failed or has not been implemented, but with no consequences to the take-permit holder.[30] There should be consequences for not achieving mitigation objectives or performance standards. The project applicant should be required to pay fines in amounts that are sufficient for an independent party to achieve the mitigation objectives originally promised, and in this case, the promises should be much more substantial. The PSA did not address mitigation monitoring even though this is one of the major elements of CEQA.

Shawn Smallwood, Ph.D.

[30] Silva, E. 1990. Mitigation reporting and monitoring: a new challenge for California agencies. Appendix VI in M. H. Remy, T. A. Thomas, S. E. Duggan, and J. G. Moose. 1990. Guide to the California Environmental Quality Act (CEQA). Solano Press Books, Point Arena, California.

Kenneth Shawn Smallwood
Curriculum Vitae

ATTACHMENT (2)

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Born May 3, 1963 in Sacramento, California. Married, father of two.

Expertise

Ecology / Wildlife interactions with human infrastructure and activities / Conservation biology

Education

Ph.D. Ecology, University of California, Davis. September 1990.
M.S. Ecology, University of California, Davis. June 1987.
B.S. Anthropology, University of California, Davis. June 1985.
Corcoran High School, Corcoran, California. June 1981.

Experience

- 212 professional publications, including:
  - 52 peer reviewed publications
  - 24 in non-peer reviewed professional outlets
  - 126 reports and declarations
  - 8 in mass media outlets
  - 2 book reviews
- 75 public presentations of research results at professional meetings
- 67 papers reviewed by me for professional publications

Associate Editor, Journal of Wildlife Management, March 2004 to 30 June 2007.

Consulting Ecologist, 7/04 to present, California Energy Commission (CEC). In collaboration with Lawrence-Livermore National Lab, I perform independent research funded by the CEC on bird behavior in the Altamont Pass Wind Resources Area. I also provide consulting services as needed to the CEC.

Consulting Ecologist, 11/99 to present, U.S. Navy. I provide endangered species surveys at multiple Navy facilities, hazardous waste site monitoring, and habitat restoration for the endangered Fresno kangaroo rat.

Part-time Lecturer, 1/98 to present, California State University, Sacramento. I have taught Contemporary Environmental Issues, Natural Resources Conservation, Mammalogy, Behavioral Ecology, and Ornithology Lab.

Senior Ecologist, 1999 to 2005, BioResource Consultants. I planned and carried out research and monitoring projects, and analyzed complex data related to avian fatalities at wind turbines, avian electrocutions on electric distribution poles across California, and avian fatalities at transmission lines.

Systems Ecologist, 7/96 to present, Consulting in the Public Interest, www.cipi.com. I am part of a multi-disciplinary consortium of scientists facilitating large-scale, environmental planning projects and litigation. We provide risk assessments, assessments of management practices, and expert witness testimony.

Chairman, Conservation Affairs Committee, The Wildlife Society--Western Section, 1999-2001.

Systems Ecologist, 1/95 to present, Institute for Sustainable Development. I head ISD's program on integrated resources management. I develop indicators of ecological integrity for large areas, using remotely sensed data, local community involvement and GIS.

Associate, 1997-1998, Department of Agronomy and Range Science, University of California, Davis.

Editorial Board Member, Environmental Management, 10/99 to 8/04.

Editorial Board Member, Ecosystem Health, 9/02 to 9/03.

Lead Scientist, 6/96 to 6/99, National Endangered Species Network. I headed NESN's efforts to inform academic scientists and environmental activists about emerging issues regarding the Endangered Species Act and other environmental laws pertaining to legally rare species. I also testified at public hearings on behalf of environmental groups and endangered species.

Ecologist, 1/97 to 6/98, Western Foundation of Vertebrate Zoology. I conducted field research to determine the impact of past mercury mining on the status of red-legged frogs in Santa Clara County, California.

Associate Editor, Biological Conservation, 9/94 to 9/95. Administered independent scientific reviews of submitted, professional papers in ecology and conservation biology, and made recommendations to the Editors.

Senior Systems Ecologist, 7/94 to 12/95, EIP Associates, Sacramento, California. Provided consulting services in environmental planning. I also developed a quantitative assessment of land units for their conservation and restoration opportunities, using the ecological resource requirements of 29 legally rare species. I mapped vegetation and land use, and derived new spatial data from a GIS overlay of these variables with soil types, flood zones, roads, and other spatially referenced data. Using these derived data, I developed a set of indicators for prioritizing areas within Yolo County that will receive mitigation funds for habitat easements and restoration.

Post-Graduate Researcher, 10/90 to 6/94, with Dr. Shu Geng, Department of Agronomy and Range Science, *U.C. Davis*. Studied landscape and management effects on temporal and spatial patterns of abundance among pocket gophers and species of Falconiformes and Carnivora in the Sacramento Valley. I also developed and analyzed a data base of energy use in California agriculture, and I assisted with a landscape (GIS) study of groundwater contamination across Tulare County, California.

Co-teacher, 1/91 to 6/91 and 1/93 to 6/93, Graduate Group in Ecology, U.C. Davis. Co-taught conservation biology with Dr. Christine Schonewald.

Reader, 3/90 to 6/90, Department of Psychology, U.C. Davis. Assisted students of Psychobiology (taught by Dr. Richard Coss) with research and writing term papers.

Research Assistant, 11/88 to 9/90, with Dr. Walter E. Howard, Department of Wildlife and Fisheries Biology, U.C. Davis. Tested durable baits for pocket gopher control in forest plantations, and developed gopher sampling methods.

Fulbright Research Fellow, Indonesia, 7/88 to 11/88. Tested use of new sampling methods for monitoring the number of Sumatran tigers and six other species of endemic felids, and evaluated methods used by other researchers.

Research Assistant, 7/87 to 6/88, with Dr. Terrell P. Salmon, Wildlife Extension, Department of Wildlife and Fisheries Biology, U.C. Davis. Developed empirical models of mammal and bird invasions in North America, and a rating system for priority research and control of exotic species based on economic, environmental, and human health hazards in California.

Student Assistant, 3/85 to 6/87, with Dr. E. Lee Fitzhugh, Wildlife Extension, Department of Wildlife and Fisheries Biology, U.C. Davis. Developed and implemented a statewide mountain lion track count for long-term monitoring of numbers and distribution. Also developed quantitative techniques to identify individual mountain lions by their tracks, and to differentiate mountain lion and dog tracks.

Projects

Research to reduce avian mortality due to wind turbines at Altamont Pass. I am using GPS and GIS to map and study environmental impacts of several thousand wind turbines. I am relating the number of raptor fatalities at wind turbines to the degree of aggregation of prey species around the turbines, as well as many other factors related to where the turbines are located, how they are designed and operated, and how raptors behave in the Altamont Pass Wind Resource Area. I also serve on the Alameda County Scientific Review Committee, charged with recommending scientific monitoring methods and mitigation measures for reducing avian mortality.

Expert Testimony and Declarations on Residential and Commercial Development Proposals. I have testified before the California Coastal Commission, California Energy Commission, County Boards of Supervisors, and City Councils, and I have participated with press conferences and have been deposed by attorneys. I prepared expert witness reports and court declarations, which are summarized under Reports (below).

Expert Testimony on Proposed Gas-fired Power Plants. I provided comments letters, declarations, expert reports, and oral testimony on the impacts and appropriate mitigation of natural gas-fired power plants in California.

Protocol-level endangered species searches and recovery efforts. I search for special-status species using Department of Fish and Game and US Fish and Wildlife Service protocols. I have searched for, or otherwise worked with, California red-legged frog, arroyo southwestern toad,

California tiger salamander, blunt-nosed leopard lizard, western pond turtle, giant kangaroo rat, Fresno kangaroo rat, San Joaquin kit fox, Sumatran tiger, willow flycatcher, least Bell's vireo, western burrowing owl, Swainson's hawk, Valley elderberry longhorn beetle and many other special-status species. I also help with recovery of the Fresno kangaroo rat at Lemoore Naval Air Station.

Conservation of the endangered Fresno kangaroo rat. I am performing applied research to identify the factors responsible for the decline of this endangered species at Lemoore Naval Air Station, and am implementing habitat enhancements designed to reverse the trend and to expand the area occupied by this species.

Workshops on HCPs. Assisted Dr. Michael Morrison with organizing and conducting a 2-day workshop on Habitat Conservation Plans, sponsored by Southern California Edison, and another 1-day workshop sponsored by PG&E. These Workshops were attended by academics, attorneys, and consultants with HCP experience. We guest-edited a Proceedings published in Environmental Management.

Mapping of biological resources along Highways 101, 46 and 41. I used GPS and GIS to delineate vegetation complexes and locations of special-status species along 26 miles of highway in San Luis Obispo County, 14 miles of highway and roadway in Monterey County, and in a large area north of Fresno, including within reclaimed gravel mining pits.

GPS mapping and monitoring at restoration sites and at Caltrans mitigation sites. I am monitoring the success of elderberry shrubs at one location, the success of willows at another location, and the response of wildlife to the succession of vegetation at both these sits. I am also using GPS to monitor the response of fossorial animals to yellow star-thistle eradication and natural grassland restoration efforts at Bear Valley, Colusa County, and at the decommissioned Mather Air Force Base in Sacramento County.

Mercury effects on Red-legged Frog. I assisted Dr. Michael Morrison and US Fish and Wildlife Service in assessing the possible impacts of historical mercury mining on the federally listed California red-legged frog in Santa Clara County. I also measured habitat variables in numerous streams.

Opposition to proposed No Surprises rule. I wrote a white paper and summary letter explaining scientific grounds for opposing the incidental take permit (ITP) rules providing ITP applicants and holders with general assurances they will be free of compliance with the Endangered Species Act once they adhere to the terms of a "properly functioning HCP." I obtained 188 signatures of scientists and environmental professionals on the letter submitted to the US Fish and Wildlife Service and the National Marine Fisheries Service. The letter was also provided to all US Senators. It helped change the prevailing view of HCPs as beneficial to listed species.

Natomas Basin Habitat Conservation Plan alternative. I designed narrow channel marsh to increase the likelihood of survival and recovery in the wild of giant garter snake, Swainson's hawk and Valley Elderberry Longhorn Beetle. The design included replication and interspersion of treatments for experimental testing of critical habitat elements. I provided a report to Northern Territories, Inc.

Cook *et al.* v. Rockwell International *et al.*, No. 90-K-181 (D. Colorado). I provided expert testimony on the role of burrowing animals in affecting the fate of buried and surface-deposited radioactive and hazardous chemical wastes at the Rocky Flats Plant, Colorado. I provided expert reports based on four site visits and the most extensive document review of burrowing animals ever conducted. I conducted transect surveys for evidence of burrowing animals and other wildlife on and around waste facilities. I also discovered substantial intrusion of waste structures by burrowing animals. I testified in federal court in November 2005, and in early 2006 my clients were awarded a $350,000,000 judgment.

Hanford Nuclear Reservation Litigation. I am providing expert testimony on the role of burrowing animals in affecting the fate of buried radioactive wastes at the Hanford Nuclear Reservation, Washington. I provided three expert reports based on three site visits and extensive document review. I predicted and verified a certain population density of pocket gophers on buried waste structures, as well as incidence of radionuclide contamination in body tissue. I conducted transect surveys for evidence of burrowing animals and other wildlife on and around waste facilities. I also discovered substantial intrusion of waste structures by burrowing animals.

Assessment of Environmental Technology Transfer to China, and Assessment of Agricultural Production System. I twice traveled to China and interviewed scientists, industrialists, agriculturalists, and the Directors of the Chinese Environmental Protection Agency and the Department of Agriculture to assess the need and possible pathways for environmental clean-up technologies and trade opportunities between the US and China. I spent a total of five weeks in China, including in Shandong and Linxion Provinces and in Beijing.

Yolo County Habitat Conservation Plan. I conducted the landscape ecology study of Yolo County to identify the priority land units to receive mitigation so as to most improve the ecosystem functionality within the County from the perspective of 29 special-status species of wildlife and plants. I used a hierarchically structured indicators approach to apply principles of landscape and ecosystem ecology, conservation biology, and local values in rating land units. I derived GIS maps to help guide the conservation area design, and then I developed implementation strategies.

Mountain Lion Track Count. I developed and conducted the carnivore monitoring program throughout California since 1985. Species counted include mountain lion, bobcat, black bear, coyote, red and gray fox, raccoon, striped skunk, badger, and black-tailed deer. Vegetation and land use are also monitored. The transect was established on dusty, dirt roads within randomly selected quadrats. These roads are searched for tracks of the carnivores, which routinely use the roads for travel paths.

Sumatran Tiger and other Felids. I designed and conducted track counts for seven species of wild cats in Sumatra, including the Sumatran tiger, fishing cat, and golden cat. I spent four months on Sumatra and Java, and learned Bahasa Indonesia (the official Indonesian language). I was awarded a Fulbright Research Fellowship to complete the project.

Wildlife in Agriculture. Beginning as my post-graduate research, I have studied pocket gophers and other wildlife in 40 alfalfa fields throughout the Sacramento Valley, and I surveyed for wildlife along a 200 mile road transect for six years. The data were analyzed using GIS and methods from landscape ecology, and the results were published and presented orally to farming groups

in California and elsewhere. I also conducted the first study of wildlife in cover crops used on vineyards and orchards.

Agricultural Energy Use and Tulare County Groundwater Study. I developed and analyzed a data base of energy use in California agriculture, and collaborated on a landscape (GIS) study of groundwater contamination across Tulare County, California.

Pocket Gopher Damage in Forest Clearcuts. I tested various poison baits and baiting regimes for pocket gopher control in forest plantations, and I developed gopher sampling methods. I conducted the most extensive field study of pocket gophers ever, involving thousands of gophers in 68 research plots on 55 clearcuts among 6 National Forests in northern California.

Risk Assessment of Exotic Species in North America. I developed empirical models of mammal and bird species invasions in North America, as well as a rating system for assigning priority research and control to exotic species in California, based on economic, environmental, and human health hazards.

Representative Clients

Law offices and environmental groups	Government agencies
Law Offices of Berger & Montague	US Department of Agriculture
Law Offices of Roy Haber	US Forest Service
Law Offices of Edward MacDonald	US Fish & Wildlife Service
Law Office of John Gabrielli	US Navy
Law Office of Bill Kopper	California Energy Commission
Law Office of Donald B. Mooney	California Office of the Attorney General
Law Office of Veneruso & Moncharsh	California Department of Fish & Game
Law Office of Steven Thompson	California Department of Transportation
California Wildlife Federation	California Department of Forestry
Defenders of Wildlife	California Department of Food & Agriculture
Sierra Club	Ventura County Counsel
National Endangered Species Network	County of Yolo
Spirit of the Sage Council	Tahoe Regional Planning Agency
The Humane Society	Sustainable Agriculture Research & Education Program
Hagens Berman LLP	Sacramento-Yolo Mosquito and Vector Control District
Environmental Protection Information Center (EPIC)	East Bay Regional Parks District
Goldberg, Kamin & Garvin, Attorneys at Law	County of Alameda
Californians for Renewable Energy (CARE)	
Seatuck Environmental Association	

Businesses	Other organizations and Individuals
Pacific Gas & Electric Co.	Don & LaNelle Silverstien
Southern California Edison Co.	Seventh Day Adventist Church
Georgia-Pacific Timber Co.	Escuela de la Raza Unida
Northern Territories Inc.	Susan Pelican and Howard Beeman
National Renewable Energy Lab	Residents Against Inconsistent Development, Inc.
David Magney Environmental Consulting	Bob Sarvey
Wildlife History Foundation	Mike Boyd
Emerald Farms	Hillcroft Neighborhood Fund
Terry Preston, Wildlife Ecology Research Center	Joint Labor Management Committee of the Retail Food Industry
G3 Energy and enXco	Lisa Rocca
Comstocks Business (magazine)	Kevin Jackson
Californians for Renewable Energy	Dawn Stover and Jay Letto
	Nancy Havassy

Representative special-status species experience

Common name	Species name	Status[1]	Description
Field experience			
California red-legged frog	*Rana aurora draytonii*	FT, CSC	Protocol searches & detected at multiple sites
Foothill yellow-legged frog	*Rana boylii*	FSC, CSC	Research and search detections at multiple sites
Western spadefoot	*Spea hammondii*	FSC, CSC	Searches and search detections
California tiger salamander	*Ambystoma californiense*	FC, CSC	Protocol searches & detections at multiple sites
Coast range newt	*Taricha torosa torosa*	CSC	Searches and multiple detections
Blunt-nosed leopard lizard	*Gambelia sila*	FE, CE	Detected in San Luis Obispo County
California Horned Lizard	*Phrynosoma coronatum frontale*	FSC, CSC	Search and detected in San Luis Obispo Co.
Western pond turtle	*Clemmys marmorata*	FSC, CSC	Searches and detected at multiple sites
San Joaquin kit fox	*Vulpes macrotis mutica*	FE, CT	Protocol searches and detections
Sumatran tiger	*Panthera tigris*		Research in Sumatra
Mountain lion	*Puma concolor californicus*	CFP	Research and publications
Point Arena mountain beaver	*Aplodontia rufa nigra*	FE, CSC	Remote camera operation
Giant kangaroo rat	*Dipodomys ingens*	FE, CE	Detected in Cholame Valley
Fresno kangaroo rat	*Dipodomys nitratoides*	FE, CE	Research and conservation at Lemoore Naval Air Station – reports
Monterey dusky-footed woodrat	*Neotoma fuscipes luciana*	FSC, CSC	Non-target captures and mapping of dens
Salt marsh harvest mouse	*Reithrodontomys raviventris*	FE, CE	Habitat assessment, monitoring
Salinas harvest mouse	*Reithrodontomys megalotus distichlus*	G5T1S1	Captures in the Salinas area; habitat assessment
California clapper rail	*Rallus longirostris*	FE, CE	Surveys at Concord Naval Weapons Station
Golden eagle	*Aquila chrysaetos*	CSC	Research in Sacramento Valley
Swainson's hawk	*Buteo swainsoni*	CT	Research in Sacramento Valley
Northern harrier	*Circus cyaeneus*	CSC	Research and publication
White-tailed kite	*Elanus leucurus*	CFP	Research and publication
Loggerhead shrike	*Lanius ludovicianus*	FSC, CSC	Research in Sacramento Valley
Least Bell's vireo	*Vireo bellii pusillus*	FE, CE	Detected in Monterey County
Willow flycatcher	*Empidonax traillii extimus*	FE, CE	Research at Sierra Nevada breeding sites
Burrowing owl	*Athene cunicularia hypugia*	FSC, CSC	Research at multiple locations
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	FT	Research on mitigation site and publication
Analytical			
Arroyo southwestern toad	*Bufo microscaphus californicus*	FE, CSC	Research and report.
Giant garter snake	*Thamnophis gigas*	FT, CE	Research and publication.
Northern goshawk	*Accipiter gentilis*	FSC, CSC	Research and publication.
Northern spotted owl	*Strix occidentalis*	FT	Research and reports. Publication in progress.

[1] FE = Federal Endangered, FT = Federal threatened, FC = Federal candidate for listing, FSC = Federal species of concern, CE = California Endangered, CT = California threatened, CFP = California Fully Protected, CSC = California Species of Concern, G5T1S1 = CNDDB rating of imperiled throughout California range.

Manuscripts Under Review

Smallwood, K. S. Wind power company compliance with mitigation plans in the Altamont Pass Wind Resource Area.

Peer Reviewed Publications

Smallwood, K. S., C. G. Thelander. 2007. Bird Mortality in the Altamont Pass Wind Resource Area, California. Journal of Wildlife Management 71: In press.

Smallwood, K. S. 2007. Estimating wind turbine-caused bird mortality. Journal of Wildlife Management 71(8): In press.

Smallwood, K. S., C. G. Thelander, M. L. Morrison, and L. M. Rugge. 2007. Burrowing owl mortality in the Altamont Pass Wind Resource Area. Journal of Wildlife Management 71:1513-1524.

Cain, J. W. III, K. S. Smallwood, M. L. Morrison, and H. L. Loffland. 2005. Influence of mammal activity on nesting success of Passerines. J. Wildlife Management 70:522-531.

Smallwood, K.S. 2002. Habitat models based on numerical comparisons. Pages 83-95 *in* Predicting species occurrences: Issues of scale and accuracy, J. M. Scott, P. J. Heglund, M. Morrison, M. Raphael, J. Haufler, and B. Wall, editors. Island Press, Covello, California.

Morrison, M. L., K. S. Smallwood, and L. S. Hall. 2002. Creating habitat through plant relocation: Lessons from Valley elderberry longhorn beetle mitigation. Ecological Restoration 21: 95-100.

Zhang, M., K. S. Smallwood, and E. Anderson. 2002. Relating indicators of ecological health and integrity to assess risks to sustainable agriculture and native biota. Pages 757-768 *in* D.J. Rapport, W.L. Lasley, D.E. Rolston, N.O. Nielsen, C.O. Qualset, and A.B. Damania (eds.), Managing for Healthy Ecosystems, Lewis Publishers, Boca Raton, Florida USA.

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- Replies to responses to comments on Mitigated Negative Declaration of the proposed Mining Permit (MIN 04-01) and Modification of Use Permit 96-02 at North Table Mountain (2006; 5 pp);
- Mitigated Negative Declaration of the proposed Mining Permit (MIN 04-01) and Modification of Use Permit 96-02 at North Table Mountain (2006; 15 pp);
- Windy Point Wind Farm Environmental Review and EIS (2006; 14 pp and 36 Powerpoint slides in reply to responses to comments);

- Shiloh I Wind Power Project EIR (2005; 18 pp);
- Buena Vista Wind Energy Project Notice of Preparation of EIR (2004; 15 pp);
- Negative Declaration of the proposed Callahan Estates Subdivision (2004; 11 pp);
- Negative Declaration of the proposed Winters Highlands Subdivision (2004; 9 pp);
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- Negative Declaration of the proposed Creekside Highlands Project, Tract 7270 (2004; 21 pp);
- Conditional Use Permit renewals from Alameda County for wind turbine operations in the Altamont Pass Wind Resource Area (2003; 41 pp);
- UC Davis Long Range Development Plan of 2003, particularly with regard to the Neighborhood Master Plan (2003; 23 pp);
- Anderson Marketplace Draft Environmental Impact Report (2003: 18 pp + 3 plates of photos);
- Negative Declaration of the proposed expansion of Temple B'nai Tikyah (2003: 6 pp);
- Antonio Mountain Ranch Specific Plan Public Draft EIR (2002: 23 pp);
- Response to testimony of experts at the East Altamont Energy Center evidentiary hearing on biological resources (2002: 9 pp);
- Revised Draft Environmental Impact Report, The Promenade (2002: 7 pp);
- Recirculated Initial Study for Calpine's proposed Pajaro Valley Energy Center (2002: 3 pp);
- UC Merced -- Declaration of Dr. Shawn Smallwood in support of petitioner's application for temporary restraining order and preliminary injunction (2002: 5 pp);
- Replies to response to comments in Final Environmental Impact Report, Atwood Ranch Unit III Subdivision (2003: 22 pp);
- Draft Environmental Impact Report, Atwood Ranch Unit III Subdivision (2002: 19 pp + 8 photos on 4 plates);
- California Energy Commission Staff Report on GWF Tracy Peaker Project (2002: 17 pp + 3 photos; follow-up report of 3 pp);
- Initial Study and Negative Declaration, Silver Bend Apartments, Placer County (2002: 13 pp);
- UC Merced Long-range Development Plan DEIR and UC Merced Community Plan DEIR (2001: 26 pp);
- Initial Study, Colusa County Power Plant (2001: 6 pp);
- Comments on Proposed Dog Park at Catlin Park, Folsom, California (2001: 5 pp + 4 photos);
- Pacific Lumber Co. (Headwaters) Habitat Conservation Plan and Environmental Impact Report (1998: 28 pp);
- Final Environmental Impact Report/Statement for Issuance of Take authorization for listed species within the MSCP planning area in San Diego County, California (Fed. Reg. 62 (60): 14938, San Diego Multi-Species Conservation Program) (1997: 10 pp);
- Permit (PRT-823773) Amendment for the Natomas Basin Habitat Conservation Plan, Sacramento, CA (Fed. Reg. 63 (101): 29020-29021) (1998);
- Draft Recovery Plan for the Giant Garter Snake (*Thamnophis gigas*). (Fed. Reg. 64(176): 49497-49498) (1999: 8 pp);
- Review of the Draft Recovery Plan for the Arroyo Southwestern Toad (*Bufo microscaphus californicus*) (1998);

- Ballona West Bluffs Project Environmental Impact Report (1999: oral presentation);
- California Board of Forestry's proposed amended Forest Practices Rules (1999);
- Negative Declaration for the Sunset Skyranch Airport Use Permit (1999);
- Calpine and Bechtel Corporations' Biological Resources Implementation and Monitoring Program (BRMIMP) for the Metcalf Energy Center (2000: 10 pp);
- California Energy Commission's Final Staff Assessment of the proposed Metcalf Energy Center (2000);
- US Fish and Wildlife Service Section 7 consultation with the California Energy Commission regarding Calpine and Bechtel Corporations' Metcalf Energy Center (2000: 4 pp);
- California Energy Commission's Preliminary Staff Assessment of the proposed Metcalf Energy Center (2000: 11 pp);
- Site-specific management plans for the Natomas Basin Conservancy's mitigation lands, prepared by Wildlands, Inc. (2000: 7 pp);
- Affidavit of K. Shawn Smallwood in Spirit of the Sage Council, et al. (Plaintiffs) vs. Bruce Babbitt, Secretary, U.S. Department of the Interior, et al. (Defendants), Injuries caused by the No Surprises policy and final rule which codifies that policy (1999: 9 pp).

I also issued formal comments on the following documents:

- Draft Program Level EIR for Covell Village (2005; 19 pp);
- Bureau of Land Management Wind Energy Programmatic EIS Scoping document (2003: 7 pp.);
- NEPA Environmental Analysis for Biosafety Level 4 National Biocontainment Laboratory (NBL) at UC Davis (2003: 7 pp);
- Notice of Preparation of UC Merced Community and Area Plan EIR, on behalf of The Wildlife Society—Western Section (2001: 8 pp.);
- Preliminary Draft Yolo County Habitat Conservation Plan (2001; 2 letters totaling 35 pp.);
- Merced County General Plan Revision, notice of Negative Declaration (2001: 2 pp.);
- Notice of Preparation of Campus Parkway EIR/EIS (2001: 7 pp.);
- Draft Recovery Plan for the bighorn sheep in the Peninsular Range (*Ovis candensis*) (2000);
- Draft Recovery Plan for the California Red-legged Frog (*Rana aurora draytonii*), on behalf of The Wildlife Society—Western Section (2000: 10 pp.);
- Sierra Nevada Forest Plan Amendment Draft Environmental Impact Statement, on behalf of The Wildlife Society—Western Section (2000: 7 pp.);
- State Water Project Supplemental Water Purchase Program, Draft Program EIR (1997);
- Davis General Plan Update EIR (2000);
- Covell Center Project EIR and EIR Supplement (1997);
- Turn of the Century EIR (1999: 10 pp);
- Proposed termination of Critical Habitat Designation under the Endangered Species Act (Fed. Reg. 64(113): 31871-31874) (1999);
- NOA Draft Addendum to the Final Handbook for Habitat Conservation Planning and Incidental Take Permitting Process, termed the HCP 5-Point Policy Plan (Fed. Reg. 64(45): 11485 - 11490) (1999).

Position Statements I prepared the following position statements:

- Recommended that the California Department of Fish and Game prioritize the extermination of the introduced southern water snake in northern California. The Wildlife Society--Western Section (2001);
- Recommended that The Wildlife Society—Western Section appoint or recommend members of the independent scientific review panel for the UC Merced environmental review process (2001);
- Opposed the siting of the University of California's 10th campus on a sensitive vernal pool/grassland complex east of Merced. The Wildlife Society--Western Section (2000);
- Opposed the legalization of ferret ownership in California. The Wildlife Society--Western Section (2000);
- Opposed the Proposed "No Surprises," "Safe Harbor," and "Candidate Conservation Agreement" rules, including permit-shield protection provisions (Fed. Reg. Vol. 62, No. 103, pp. 29091-29098 and No. 113, pp. 32189-32194). This statement was signed by 188 scientists and went to the responsible federal agencies, as well as to the U.S. Senate and House of Representatives.

Printed Mass Media

Smallwood, K.S., D. Mooney, and M. McGuinness. 2003. We must stop the UCD biolab now. Op-Ed to the Davis Enterprise.

Smallwood, K.S. 2002. Spring Lake threatens Davis. Op-Ed to the Davis Enterprise.

Smallwood, K.S. Summer, 2001. Mitigation of habitation. The Flatlander, Davis, California.

Entrikan, R.K. and K.S. Smallwood. 2000. Measure O: Flawed law would lock in new taxes. Op-Ed to the Davis Enterprise.

Smallwood, K.S. 2000. Davis delegation lobbies Congress for Wildlife conservation. Op-Ed to the Davis Enterprise.

Smallwood, K.S. 1998. Davis Visions. The Flatlander, Davis, California.

Smallwood, K.S. 1997. Last grab for Yolo's land and water. The Flatlander, Davis, California.

Smallwood, K.S. 1997. The Yolo County HCP. Op-Ed to the Davis Enterprise.

Radio/Television

KDVS Speaking in Tongues (host Ron Glick), Yolo County HCP: 1 hour. December 27, 2001;

KDVS Speaking in Tongues (host Ron Glick), Yolo County HCP: 1 hour. May 3, 2001;

KDVS Speaking in Tongues (host Ron Glick), Yolo County HCP: 1 hour. February 8, 2001;

KDVS Speaking in Tongues (host Ron Glick & Shawn Smallwood), California Energy Crisis: 1 hour. Jan. 25, 2001;

KDVS Speaking in Tongues (host Ron Glick), Headwaters Forest HCP: 1 hour. 1998;

Davis Cable Channel (host Gerald Heffernon), Burrowing owls in Davis: half hour. June, 2000;

Davis Cable Channel (hosted by Davis League of Women Voters), Measure O debate: 1 hour. October, 2000;

KXTV 10, In Your Interest, The Endangered Species Act: half hour. 1997.

Posters at Professional Meetings

Smallwood, K. S. and C. G. Thelander. 2005. Lessons learned from five years of avian mortality research in the Altamont Pass WRA. AWEA conference, Denver, May 2005.

Neher, L., L. Wilder, J. Woo, L. Spiegel, D. Yen-Nakafugi, and K.S. Smallwood. 2005. Bird's eye view on California wind. AWEA conference, Denver, May 2005.

Smallwood, K. S., C. G. Thelander and L. Spiegel. 2003. Toward a predictive model of avian fatalities in the Altamont Pass Wind Resource Area. Windpower 2003 Conference and Convention, Austin, Texas.

Smallwood, K.S. and Eva Butler. 2002. Pocket Gopher Response to Yellow Star-thistle Eradication as part of Grassland Restoration at Decommissioned Mather Air Force Base, Sacramento County, California. White Mountain Research Station Open House, Barcroft Station.

Smallwood, K.S. and Michael L. Morrison. 2002. Fresno kangaroo rat (*Dipodomys nitratoides*) Conservation Research at Resources Management Area 5, Lemoore Naval Air Station. White Mountain Research Station Open House, Barcroft Station.

Smallwood, K.S. and E.L. Fitzhugh. 1989. Differentiating mountain lion and dog tracks. Third Mountain Lion Workshop, Prescott, AZ.

Smith, T. R. and K. S. Smallwood. 2000. Effects of study area size, location, season, and allometry on reported *Sorex* shrew densities. Annual Meeting of the Western Section of The Wildlife Society.

Presentations at Professional Meetings and Seminars

Environmental barriers to wind power. Getting Real About Renewables: Economic and Environmental Barriers to Biofuels and Wind Energy. A symposium sponsored by the Environmental & Energy Law & Policy Journal, University of Houston Law Center, Houston, 23 February 2007.

Lessons learned about bird collisions with wind turbines in the Altamont Pass and other US wind farms. Meeting with Japan Ministry of the Environment and Japan Ministry of the Economy, Wild Bird Society of Japan, and other NGOs Tokyo, Japan, 9 November 2006.

Lessons learned about bird collisions with wind turbines in the Altamont Pass and other US wind farms. Symposium on bird collisions with wind turbines. Wild Bird Society of Japan, Tokyo, Japan, 4 November 2006.

Responses of Fresno kangaroo rats to habitat improvements in an adaptive management framework. California Society for Ecological Restoration (SERCAL) 13th Annual Conference, UC Santa Barbara, 27 October 2006.

Fatality associations as the basis for predictive models of fatalities in the Altamont Pass Wind Resource Area. EEI/APLIC/PIER Workshop, 2006 Biologist Task Force and Avian Interaction with Electric Facilities Meeting, Pleasanton, California, 28 April 2006.

Burrowing owl burrows and wind turbine collisions in the Altamont Pass Wind Resource Area. The Wildlife Society—Western Section Annual Meeting, Sacramento, California, February 8, 2006.

Mitigation at wind farms. Workshop: Understanding and resolving bird and bat impacts. American Wind Energy Association and Audubon Society. Los Angeles, CA. January 10 and 11, 2006.

Incorporating data from the California Wildlife Habitat Relationships (CWHR) system into an impact assessment tool for birds near wind farms. Shawn Smallwood, Kevin Hunting, Marcus Yee, Linda Spiegel, Monica Parisi. Workshop: Understanding and resolving bird and bat impacts. American Wind Energy Association and Audubon Society. Los Angeles, CA. January 10 and 11, 2006.

Toward indicating threats to birds by California's new wind farms. California Energy Commission, Sacramento, May 26, 2005.

Avian collisions in the Altamont Pass. California Energy Commission, Sacramento, May 26, 2005.

Ecological solutions for avian collisions with wind turbines in the Altamont Pass Wind Resource Area. EPRI Environmental Sector Council, Monterey, California, February 17, 2005.

Ecological solutions for avian collisions with wind turbines in the Altamont Pass Wind Resource Area. The Wildlife Society—Western Section Annual Meeting, Sacramento, California, January 19, 2005.

Associations between avian fatalities and attributes of electric distribution poles in California. The Wildlife Society—Western Section Annual Meeting, Sacramento, California, January 19, 2005.

Minimizing avian mortality in the Altamont Pass Wind Resources Area. UC Davis Wind Energy Collaborative Forum, Palm Springs, California, December 14, 2004.

Selecting electric distribution poles for priority retrofitting to reduce raptor mortality. Raptor Research Foundation Meeting, Bakersfield, California, November 10, 2004.

Responses of Fresno kangaroo rats to habitat improvements in an adaptive management framework. Annual Meeting of the Society for Ecological Restoration, South Lake Tahoe, California, October 16, 2004.

Lessons learned from five years of avian mortality research at the Altamont Pass Wind Resources Area in California. The Wildlife Society Annual Meeting, Calgary, Canada, September 2004.

The ecology and impacts of power generation at Altamont Pass. Sacramento Petroleum Association, Sacramento, California, August 18, 2004.

Burrowing owl mortality in the Altamont Pass Wind Resource Area. California Burrowing Owl Consortium meeting, Hayward, California, February 7, 2004.

Burrowing owl mortality in the Altamont Pass Wind Resource Area. California Burrowing Owl Symposium, Sacramento, November 2, 2003.

Raptor Mortality at the Altamont Pass Wind Resource Area. National Wind Coordinating Committee, Washington, D.C., November 17, 2003.

Raptor Behavior at the Altamont Pass Wind Resource Area. Annual Meeting of the Raptor Research Foundation, Anchorage, Alaska, September, 2003.

Raptor Mortality at the Altamont Pass Wind Resource Area. Annual Meeting of the Raptor Research Foundation, Anchorage, Alaska, September, 2003.

California mountain lions. Ecological & Environmental Issues Seminar, Department of Biology, California State University, Sacramento, November, 2000.

Intra- and inter-turbine string comparison of fatalities to animal burrow densities at Altamont Pass. National Wind Coordinating Committee, Carmel, California, May, 2000.

Using a Geographic Positioning System (GPS) to map wildlife and habitat. Annual Meeting of the Western Section of The Wildlife Society, Riverside, CA, January, 2000.

Suggested standards for science applied to conservation issues. Annual Meeting of the Western Section of The Wildlife Society, Riverside, CA, January, 2000.

The indicators framework applied to ecological restoration in Yolo County, California. Society for Ecological Restoration, September 25, 1999.

Ecological restoration in the context of animal social units and their habitat areas. Society for Ecological Restoration, September 24, 1999.

Relating Indicators of Ecological Health and Integrity to Assess Risks to Sustainable Agriculture and Native Biota. International Conference on Ecosystem Health, August 16, 1999.

A crosswalk from the Endangered Species Act to the HCP Handbook and real HCPs. Southern California Edison, Co. and California Energy Commission, March 4-5, 1999.

Mountain lion track counts in California: Implications for Management. Ecological & Environmental Issues Seminar, Department of Biological Sciences, California State University, Sacramento, November 4, 1998.

"No Surprises" -- Lack of science in the HCP process. California Native Plant Society Annual Conservation Conference, The Presidio, San Francisco, September 7, 1997.

In Your Interest. A half hour weekly show aired on Channel 10 Television, Sacramento. In this episode, I served on a panel of experts discussing problems with the implementation of the Endangered Species Act. Aired August 31, 1997.

Spatial scaling of pocket gopher (*Geomyidae*) density. Southwestern Association of Naturalists 44th Meeting, Fayetteville, Arkansas, April 10, 1997.

Estimating prairie dog and pocket gopher burrow volume. Southwestern Association of Naturalists 44th Meeting, Fayetteville, Arkansas, April 10, 1997.

Ten years of mountain lion track survey. Fifth Mountain Lion Workshop, San Diego, February 27, 1996.

Study and interpretive design effects on mountain lion density estimates. Fifth Mountain Lion Workshop, San Diego, February 27, 1996.

Small animal control. Session moderator and speaker at the California Farm Conference, Sacramento, California, Feb. 28, 1995.

Small animal control. Ecological Farming Conference, Asylomar, California, Jan. 28, 1995.

Habitat associations of the Swainson's Hawk in the Sacramento Valley's agricultural landscape. 1994 Raptor Research Foundation Meeting, Flagstaff, Arizona.

Alfalfa as wildlife habitat. Seed Industry Conference, Woodland, California, May 4, 1994.

Habitats and vertebrate pests: impacts and management. Managing Farmland to Bring Back Game Birds and Wildlife to the Central Valley. Yolo County Resource Conservation District, U.C. Davis, February 19, 1994.

Management of gophers and alfalfa as wildlife habitat. Orland Alfalfa Production Meeting and Sacramento Valley Alfalfa Production Meeting, February 1 and 2, 1994.

Patterns of wildlife movement in a farming landscape. Wildlife and Fisheries Biology Seminar Series: Recent Advances in Wildlife, Fish, and Conservation Biology, U.C. Davis, Dec. 6, 1993.

Alfalfa as wildlife habitat. California Alfalfa Symposium, Fresno, California, Dec. 9, 1993.

Management of pocket gophers in Sacramento Valley alfalfa. California Alfalfa Symposium, Fresno, California, Dec. 8, 1993.

Association analysis of raptors in a farming landscape. Plenary speaker at Raptor Research Foundation Meeting, Charlotte, North Carolina, Nov. 6, 1993.

Landscape strategies for biological control and IPM. Plenary speaker, International Conference on Integrated Resource Management and Sustainable Agriculture, Beijing, China, Sept. 11, 1993.

Landscape Ecology Study of Pocket Gophers in Alfalfa. Alfalfa Field Day, U.C. Davis, July 1993.

Patterns of wildlife movement in a farming landscape. Spatial Data Analysis Colloquium, U.C. Davis, August 6, 1993.

Sound stewardship of wildlife. Veterinary Medicine Seminar: Ethics of Animal Use, U.C. Davis. May 1993.

Landscape ecology study of pocket gophers in alfalfa. Five County Grower's Meeting, Tracy, California. February 1993.

Turbulence and the community organizers: The role of invading species in ordering a turbulent system, and the factors for invasion success. Ecology Graduate Student Association Colloquium, U.C. Davis. May 1990.

Evaluation of exotic vertebrate pests. Fourteenth Vertebrate Pest Conference, Sacramento, California. March 1990.

Analytical methods for predicting success of mammal introductions to North America. The Western Section of the Wildlife Society, Hilo, Hawaii. February 1988.

A state-wide mountain lion track survey. Sacramento County Dept Parks and Recreation. April 1986.

The mountain lion in California. Davis Chapter of the Audubon Society. October 1985.

Ecology Graduate Student Seminars, U.C. Davis, 1985-1990: Social behavior of the mountain lion; Mountain lion control; Political status of the mountain lion in California.

Other forms of Participation at Professional Meetings

- Chair of Animal Damage Management Session, The Wildlife Society, Annual Meeting, Reno, Nevada, September 26, 2001.

- Chair of Technical Session: Human communities and ecosystem health: Comparing perspectives and making connection. Managing for Ecosystem Health, International Congress on Ecosystem Health, Sacramento, CA August 15-20, 1999.

- Student Awards Committee, Annual Meeting of the Western Section of The Wildlife Society, Riverside, CA, January, 2000.

- Student Mentor, Annual Meeting of the Western Section of The Wildlife Society, Riverside, CA, January, 2000.

Reviews of Journal Papers (Number of papers I reviewed for each journal)

Journal	Papers reviewed	Journal	Papers reviewed
American Naturalist	1	Journal of Animal Ecology	1
Auk	1	Journal of Raptor Research	1
Biological Conservation	>31	National Renewable Energy Lab reports	4
Canadian Journal of Zoology	1	Oikos	1
Ecosystem Health	1	The Prairie Naturalist	1
Environmental Conservation	3	Restoration Ecology	1
Environmental Management	15	Southwestern Naturalist	1
Functional Ecology	1	The Wildlife Society--Western Section Trans.	3
Journal of Zoology (London)	1	Proc. Int. Congress on Managing for Ecosystem Health	1
Journal of Applied Ecology	1	Transactions in GIS	1
Ecology	1		
Total in my records maintained since 1997			68

Committees

Scientific Review Committee, Alameda County, Altamont Pass Wind Resource Area
Ph.D. Thesis Committee, Steve Anderson, University of California, Davis
MS Thesis Committee, Marcus Yee, California State University, Sacramento
Board Member, Iron Mountain Conservancy

Other Professional Activities or Products

Testified in Federal Court in Denver during 2005 over the fate of radionuclides in the soil at Rocky Flats Plant after exposure to burrowing animals. My clients won a judgment of $350,000,000.

Memberships in Professional Societies

The Wildlife Society
Society for Ecological Restoration
Association of Southwest Naturalists
Raptor Research Foundation
American Museum of Natural History

Honors and Awards

Certificate of Appreciation, The Wildlife Society—Western Section, 2000, 2001
Fulbright Research Fellowship to Indonesia, 1987.
Northern California Athletic Association Most Valuable Cross Country Runner, 1984.
J.G. Boswell Full Academic Scholarship, 1981 (Paid expenses for undergraduate education).
American Legion Award, Corcoran High School, 1981, and John Muir Junior High, 1977.
CIF Section Champion, Cross Country in 1978 and Track & Field 2 mile run in 1981.
National Junior Record, 20 kilometer run, 1982.
National Age Group Record, 1500 meter run, 1978

Community Activities

District 64 Little League Umpire, 2003-2007
Dixon Little League Umpire, 2006-07
Davis Little League Chief Umpire and Board member, 2004-2005
Davis Little League Safety Officer, 2004-2005
Davis Little League Certified Umpire, 2002-2004
Davis Little League Scorekeeper, 2002
Davis Visioning Group member
Petitioner for Writ of Mandate under the California Environmental Quality Act against City of Woodland decision to approve the Spring Lake Specific Plan, 2002
Served on campaign committee for City Council candidate

PSA Air Quality Comments – Bob Sarvey **ATTACHMENT (3)**

Staff states in the PSA that "In carrying out this analysis, the California Energy Commission (Energy Commission) staff evaluated the following three major points: The following comments will address each of the three major points and explain the deficiencies in Staff's Analysis.

1) Whether the CGS is likely to conform with applicable federal, state and Colusa County Air Pollution Control District air quality laws, ordinances, regulations, and standards (Title 20, California Code of Regulations Section 1744 [b]), PSA 4.1

According to the PSA the "California Energy Commission staff's analysis indicates that the Colusa Generating Station project would comply with all applicable Air Quality Laws, Ordinances, Regulations, and Standards (LORS) and should not result in significant air quality impacts." That statement is not supported by recent determinations of Best Available Control Technology (BACT)[1].

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[1] Federal BACT applies to major sources that emit pollutants subject to the PSD program authorized under Part C, Title I of the federal Clean Air Act. It has also been used the permitting programs of some rural California districts which comply with all national ambient air quality standards. In addition, some districts have employed a BACT requirement in conjunction with a LAER requirement.1 In these districts, less stringent control technology requirements are used with lower net emission increase thresholds associated with larger minor sources or acceptable projected air quality impacts. Lower levels of net emission increase may trigger control technology requirements equivalent to federal BACT. Control technology requirements equivalent to LAER may be triggered by higher net emission increases likely to be associated with major source or unacceptable projected air quality impacts.

Section 169(3) of the federal Clean Air Act defines BACT as follows:

The term "best available control technology" means an emission limitation based on the maximum degree of reduction of each pollutant subject to regulation under this Act emitted from or which results from any major emitting facility, which the permitting authority, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such facility through application of production processes and available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of each such pollutant. In no event shall application of "best available control technology" result in emissions of any pollutant which will exceed the emissions allowed by any applicable standard established pursuant to section 111 or 112 of this Act. Emissions from any source utilizing clean fuels, or any other means, to comply with this paragraph shall not be allowed to increase above levels that would have been required under this paragraph as it existed prior to enactment of the federal Clean Air Act Amendments of 1990.

The definition states that BACT "means an emission limitation based on the maximum degree of reduction of each pollutant subject to regulation under this Act emitted from or which results from any major emitting facility." It is interesting to note that BACT is somewhat of a misnomer. The form of the requirement is defined as an emission limitation and not as an equipment

The project does not comply with Best Available Control Requirements. First the projects CO Emission limitations do not comply with recent BACT determinations for other similar projects. As pointed out in the Application for Certification in Table 8.1-37 two recent energy projects the Magnolia and the Malburg Energy facilities have been permitted at 2 ppm for CO. The SCAQMD has determined that 2 ppm for CO is BACT through the permitting of the Magnolia Power Project. http://www.aqmd.gov/bact/386305Magnolia.doc This represents the current BACT limit for combined cycle projects like the CGS.

The estimates provided for startup and shutdown emissions for CO are understated. Recent amendments processed by the California Energy Commission have demonstrated that CO emissions during cold starts are substantially higher than reflected in the PSA for the CGS. In Air Quality Table 14 in the PSA it lists that CO emissions per turbine would not exceed 373 pounds per hour and 1335 pounds per event. The Delta Energy Center was recently granted an amendment for 2,514 pounds per turbine per hour and 9,750 pounds per event. http://www.energy.ca.gov/sitingcases/delta/compliance/2004-10-06_order_approving.html

BACT/ LEAR[2] for VOC's and ammonia slip for large combined cycle turbines of this type was established by the ANP Blackstone Project application number 118969 in Blackstone Massachusetts. The limits established for this project are 1.4 PPMVD for VOC's, and 2 PPMVD for Ammonia slip all averaged over three hours. The Blackstone Project has consistently met these levels and these limits are achieved in practice. District Rule 3.6(b) 5A states:

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standard. Therefore, one is constrained to assume that the emission limitation would, in many cases, correspond to the emission rate achieved with either basic or control equipment which would otherwise be determined to be an appropriate control technology requirement. In other words, BACT should be established as a performance requirement, not as an equipment requirement, on authorities to construct and permits to operate.

[2] The federal LAER is defined in Section 171(3) of the federal Clean Air Act.[3] LAER focuses on requiring the most stringent emission limitation achieved in practice for such class or category of source, or which is contained in the SIP of any state for the same (i.e., RACT). There is relief provided from potentially stringent requirements originating from the SIPs if the applicant can demonstrate that such a limitation is not achievable. However, no requirement can be less stringent than federal NSPS.

> The term "lowest achievable emission rate" means for any source, that rate of emissions which reflects --
>
> (a) the most stringent emission limitation which is contained in the implementation plan of any State for such class or category of source, unless the owner or operator of the proposed source demonstrates that such limitations are not achievable, or
>
> (b) the most stringent emission limitation which is achieved in practice by such class or category of source, whichever is more stringent.
>
> In no event shall the application of this term permit a proposed new or modified source to emit any pollutant in excess of the amount allowable under applicable new source standards of performance.

"Best Available Control Technology means for any emissions unit the more stringent of the most effective emission control device, emission limit, or technique that has been required or used for the type of equipment comprising such emissions unit unless the applicant demonstrates to the satisfaction of the APCO that such limitations are not achievable."

Source tests on the Blackstone units were performed on June 5-7, and December 5-6, 2001, and May 15, 2002 Results are below

Unit	Date	Load	NOx	CO	VOC	NH3
1	June	75%	1.6	<0.1	0.2	.06
1	June	50%	1.4	0.5	0.2	.08
2	July	75%	1.5	<0.1	0.4	.02
2	July	50%	1.7	0.8	0.4	0.2
2	Dec	87%	1.4	<0.1	<0.1	.05
1	Feb	87%	1.7	0.3	0.1	0.1
1	May	87%	1.6	0.1	0.1	0.1
2	May	87%	1.6	0.0	0.1	0.1

VOC emissions are also understated for cold starts. Recent performance evaluations of exiting power plants have demonstrated VOC emissions of 134 pounds per hour for GE frame 7 Machines and similar turbines. This could affect the health risk assessment due to the increased emission of acrolein and other HAP's. These low emission estimates for VOC's must be addressed in the health risk assessment in the FSA.
http://www.energy.ca.gov/sitingcases/mosslanding/compliance/2003-12-24_STAFF_ANALYSYS.PDF

2) Whether the CGS is likely to cause significant new violations of air quality standards or contribute to existing violations of those standards (Title 20, California Code of Regulations Section 1742 [b]), and

The PSA correctly determines that the projects impacts will contribute to existing violations of PM-10 and Ozone standards. There is also ample evidence to determine that the project in conjunction with other projects will violate the Federal NO2 standard of 470 ug/m3. This determination was made without analyzing the full NOx emissions of the Delevan Compressor Station. The applicant's analysis only includes the emission form the three turbines which emit a total of 40 tons of NOx per year. This analysis fails to include a substantial amount of NOx emissions from the adjacent compressor station. These emissions have varied from a high of 356 tons per year of NOx per year in 2004 http://www.arb.ca.gov/aqd/almanac/almanac04/textfiles/tableA_18.txt to 202 tons per year in the most recent 2007 CARB almanac
http://www.arb.ca.gov/aqd/almanac/almanac07/excel/tableA_20.xls .

The applicant's analysis utilizing 2003 emissions failed to include these emissions in the cumulative air analysis. Staffs Cumulative analysis in the FSA should include the other substantial amounts of NOx emissions per year as reported in the CARB Almanac. These emissions have the potential to affect crop yield, farm workers, residents and wildlife in the project area. Colusa County's total NOx emissions are estimated at 8 tons per year in 2010 when the CGS will come on line. The Delevan Compressor Station and the CGS will account for almost 15% of the daily NOx emissions in Colusa County.

3) **Whether the mitigation proposed for the CGS is adequate to lessen the potential impacts to a level of insignificance (Title 20, California Code of Regulations section 1742 [b]).**

The use of agricultural burn cessation ERCs for offsetting the project's emissions does not provide permanent long term emission reductions. For ERCs to be created, the amount of reductions in emissions cannot fluctuate over time. Emission reductions from the cessation of agricultural burning can never be permanent, for purposes of ERCs, because agricultural practices or crops can change at any time and agricultural lands can be converted to non-agricultural uses, such as residential development. Agricultural ERC's do not provide the CEQA mitigation necessary to approve this project. Agricultural burn restrictions in the Sacramento Valley prohibit open burning on days of adverse air quality. http://www.colusanet.com/apcd/burn_information.asp

The burning which comprises these ERC's proposed in this application would not occur when the air quality is the worse but the power plant would be operating since these poor air quality days are generally high electricity usage days Therefore the mitigation provided in he form of Agricultural Burn Cessation ERC's is ineffective during the times when the need for the emission reductions are greatest. The projects ERC package does not mitigate the projects emissions at the most critical times as required by CEQA.

Additionally the offset package still requires a significant amount of third quarter NO2 and PM10 ERCs. This leaves unmitigated emissions in the third quarter when ozone and PM-10 violations can occur. The offset package does not provide the reductions in the third quarter to create a net air quality benefit.

The PDOC proposes a 1.4:1 ratio as a VOC for NO_x interpollutant ratio. For precursors of ozone, i.e., NO_x and VOC, the discount factor should be determined based on the results of extensive modeling exercises using site specific ambient air conditions. The offset ratio here was determined without modeling of the districts ambient conditions and was roughly estimated for studies from other districts far away from the project site. The Air Resources Board, in a letter to the Energy Commission received after the end date of the PDOC comment period (ARB, 2007d), has stated that VOC for NOx interpollutant

offsets should not be allowed at any offset ratio. Staffs position in the PSA that this issue should be worked out between the ARB and the Air District is irresponsible since it is staff that has the responsibility to mitigate this project fully under CEQA.

The ammonia emissions resulting from the use of SCR have another environmental impact through potential formation of secondary particulate matter emissions, such as ammonium nitrate. Because of the complex nature of the chemical reactions and dynamics involved in the formation of secondary particulates, it is difficult to estimate the amount of secondary particulate matter that will be formed from the emission of a given amount of ammonia. As demonstrated above large combined cycle turbines can meet ammonia slip limits as low as 2ppm. The FSA should provide an analysis of particulate matter formation for ammonia emissions. The PSA should not marginalize the effects of these emissions by stating that Colusa County is ammonia rich.

The PSA also does not discuss alternative technologies which do not utilize ammonia. In a March 24, 2000 letter sent to local air pollution control districts, EPA Region 9 stated that the $SCONO_x$ Catalytic Adsorption System should be included in any BACT/LAER analysis for combined cycle gas turbine power plant projects since it can achieve the BACT/LAER emission specification for NO_x of 2.0 ppmvd @ 15% O_2, averaged over one hour or 2.0 ppmvd @ 15% O_2, averaged over three hours. In this letter, EPA stated that ABB Alstom Power, the exclusive licensee for $SCONO_x$ applications, has conducted "full-scale damper testing" that demonstrates that $SCONO_x$ is technically feasible for gas turbines of the size proposed for the CGS.

ATTACHMENT (4)

Emerald Farms has asked me to prepare the following comments on the PSA for the Colusa Generating Station application 06-AFC-9 before the CEC.

DECLARATION OF
Robert Sarvey

I, Robert Sarvey, declare as follows:

1. I am a resident of Tracy California

2. My qualifications and experience are attached.

3. I prepared the attached comments on the Preliminary Staff Assessment prepared by the CEC.

4. It is my opinion that the attached prepared testimony is valid and accurate with respect to the issues that it addresses.

5. I am personally familiar with the facts and conclusions related in the attached comments and if called as a witness could testify competently thereto.

I declare under penalty of perjury, under the laws of the State of California, that the foregoing is true and correct to the best of my knowledge and that this declaration was executed at Tracy, California on August 20, 2007.

Robert Sarvey

Resume

Education

Bachelors Degree in Accounting, Cal State Hayward awarded 1975

Masters Degree in Taxation and Public Policy, Cal State Hayward
Awarded 1985

Awards and affiliations

US Environmental Protection Agency Hazardous Waste Citizen of the year award 2000.

San Joaquin Valley Air Pollution Control District Citizens Advisory Committee

Experience

Intervenor GWF Peaker Plant 01-AFC-16

Intervenor East Altamont Energy Center 01-AFC-04

Intervenor Modesto Irrigation District 03-SPPE-01

Intervenor Tesla Power Plant 01-AFC-24

Intervenor San Francisco Energy Reliability Project 04-AFC-1

Technical Assistant Consumes Power Project 01-AFC-19