

Attachment K

Public Comments/Correspondence



State of California - The Natural Resources Agency
 DEPARTMENT OF FISH AND GAME
 South Coast Region
 3883 Ruffin Road
 San Diego, CA 92123
 (858) 467-4201
<http://www.dfg.ca.gov>

EDMUND G. BROWN JR., Governor
 CHARLTON H. BONHAM, Director



LATE SUBMITTAL

#5

April 12, 2012

Mr. Matthew Schneider
 County of San Diego
 Department of Planning and Land Use
 5201 Ruffin Road, Suite B
 San Diego, California 92123

APR 13 2012

Received by the
 San Diego County
 Planning Commission

Subject: ~~County of San Diego and Department of Fish and Game's March 29, 2012 Follow Up Meeting Regarding Wind Energy Zoning Ordinance and General Plan Amendment and Response to Public Comment (POD10-007, LOG NO 09-00-003) San Diego County (SCH# 2010091030).~~

Dear Mr. Schneider:

The Department of Fish and Game (Department) and the County of San Diego (County) met on March 29, 2012, to discuss the Wind Energy Zoning Ordinance (Ordinance) and General Plan Amendments (Project) dated November 8, 2011. The Department provided comments on the December 30, 2011 on the Draft Environmental Impact Report (DEIR) prepared by the County acting as the Lead Agency. The County was in the process of preparing the response to the Department's comments to the DEIR and was preparing to submit recommendations to the Planning Commission on April 13, 2012, at the time of the meeting, and has subsequently published the Response to Comments on the County website (<http://www.sdcountry.ca.gov/dplu/advance/POD10007DEIR.html>). The Department suggested a meeting with the County prior to the Planning Commission meeting to discuss biological implications as a result of the proposed ministerial permit process for small wind projects. The purpose of the meeting was to discuss measures which could be incorporated into the ministerial process to avoid and minimize impacts to biological resources and discuss the implications of the ordinance to Department programs (California Environmental Quality Act (CEQA), Public Resources Code section 21000, et seq.; California Endangered Species Act (CESA), Fish and Game Code section 2050, et seq.; Natural Community Conservation Planning Act (NCCPA), Fish and Game Code Section 2800, et seq.; and Lake and Streambed Alteration Agreement, Fish and Game Code Section 1600, et seq.). Due to the Department's need to respond before the Planning Commission meeting, the Department may provide additional comments of the DEIR Response to Comments, once they can be reviewed more thoroughly. The Department requests the County provide Department notification of the Board of Supervisor meeting once a hearing date has been scheduled for this Project.

The County Ordinance establishes new guidelines for small and large wind turbine projects. Large projects would still require Major Use Permits, and are therefore, not discussed further in this letter. The purpose of this letter is to provide comments on the ministerial process proposed for small wind projects and meteorological towers.

Adequacy of Environmental Review Under CEQA

CEQA applies to all "discretionary projects proposed to be carried out or approved by public agencies." (Pub. Res. Code, § 21080, subd. (a).) For purposes of CEQA, a project is "any

activity which may cause a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment." (Pub. Res. Code, § 21065.) A public agency seeking to approve a project must determine whether the project "may have a significant effect on the environment and, if so, prepare an environmental impact report." (Pub. Res. Code, § 21100, subd. (a).) In addition to complying with these procedural requirements, CEQA also imposes a "substantive mandate" on public agencies not to approve any project with significant environmental effects if "there are feasible alternatives or mitigation measures" that can substantially lessen or avoid those effects. (*Mountain Lion Foundation v. Fish & Game Comm.* (1997) 16 Cal.4th 104, 134.).

The approval of amendments to the Ordinance and General Plan constitutes a discretionary approval of a project subject to CEQA. The DEIR prepared by the County must, therefore, analyze all potentially significant environmental effects that may occur as a result of the project and impose feasible measures to avoid, minimize, or mitigate those effects. Because the amendments seek to modify and reestablish a ministerial process for approving small wind turbine projects, which would allow such projects to be approved without further project-specific CEQA review, all potentially significant environmental effects of reasonably anticipated small wind turbine projects must be analyzed and mitigated during the CEQA process for the amendments. While the adoption of a statement of Overriding Considerations allows a Lead Agency to approve a project with known significant environmental effects that cannot be mitigated to a level below significance, it does not relieve the agency from identifying and fully analyzing those impacts and identifying feasible mitigation measures. Because the small wind project locations are not identified in the DEIR, the full impacts of the projects could not be identified or evaluated in the DEIR. Without an analysis of the impacts, potentially feasible mitigation measures for specific projects cannot be identified. Contrary to typical small development projects, where direct impacts to biological resources are reasonably known before construction and typically do not continue for the life of the project, any small wind turbine projects can have significant effects on biological resources including endangered, threatened, and candidate species (collectively, "listed species") any time during its use, and for as long as the turbine is in use.

A project proponent constructing and operating a small wind turbine project that may result in take of listed species would be recommended, by the Department, to consult with and if necessary, obtain an incidental take permit (ITP) from the Department. Without an ITP for listed species, the proponent is at risk of prosecution should take occur during the operation of the turbine. (Fish & Game Code § 2080, *et seq.*) In addition, any small wind turbine projects that will substantially divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of any river, stream, or lake or deposit debris or waste into any river, stream, or lake, the project proponent must notify the Department and enter into a lake or streambed alteration agreement (LSAA) pursuant to Fish and Game Code Section 1600, *et seq.*

Anytime a local government agency approves a project and an ITP or LSAA is required, the Department serves as a Responsible Agency under CEQA and has its own independent obligation to ensure that adequate environmental review is completed and that CEQA's substantive mandate is satisfied with respect to those environmental impacts that fall within the scope of the Department's permitting jurisdiction. (*San Diego Navy Broadway Complex Coalition v. City of San Diego* (2010) 185 Cal.App.4th 924, 938-41.). If the Lead Agency's environmental document (e.g. Negative Declaration, Mitigated Negative Declaration, or EIR) fails to fully analyze the reasonably foreseeable effects of small wind turbine projects on biological resources subject to regulation under CESA or Section 1600, *et seq.*, the Department may not be able to rely on the environmental document in its role as a Responsible Agency permitting the project. In that event, the Department may be required to assume Lead Agency

status and conduct additional environmental review to comply with CEQA's procedural requirements and substantive mandate and to lay the foundation for issuance of an ITP or LSAA. (Pub. Res. Code, § 21166; CEQA Guidelines, §§ 15052, 15096, 15162.) If the Department is required to prepare a subsequent or supplemental environmental document or an addendum and existing such document, this could result in significant delays for project applicants and may further impede wind energy development in the County.

The Department provides the following comments to the Response to Comments:

While Department understands the County's need to streamline the permitting process for small, personal-use turbines that appear to have minimal to no impacts to biological resources, the Department remains concerned the use of a ministerial permit process for approving small turbines could potentially lead to significant and avoidable impacts to State-listed species and resources not identified in the EIR. The EIR and the conditions included in the Response to Comments do not effectively resolve the potential biological constraints resulting from the small wind projects. The Department does acknowledge the County has included additional criteria to the ministerial permit process that will be added to Section 6951.a of the Ordinance. The Department offers the following additional comments:

Additional Measures Included Avoiding Impacts to Streams

The County added the following measures: No part of the wind turbine shall be closer than 300 feet or 5 times the turbine height, which ever is greater from the following: Blue line watercourse(s) as identified on the United States Geological Survey (USGS) Topographic Map. The measures would minimize impacts to streams and riparian birds associated with those streams. The Department is concerned the use of the USGS blue line stream to designate streams, falls well short of the full extent of the Department's jurisdiction under Fish and Game Code Section 1600 *et seq.* The Department is concerned the use of this system of mapped drainages is not consistent with the Department's criteria for a lake or stream, and could lead to the applicant wrongly assume impacts to a smaller, unmapped drainage would not require notification to the Department. The Department recommends the County include a definition, or language in the Ordinance or within the Ministerial permit process to educate the applicant to the purview of the Department. The Department recommends the County include a requirement for the applicant to consult with the Department on any project with the potential to impact streams.

Eagle Buffers

The County incorporates a measure that would exclude turbines within 4,000 feet of known golden eagle nests. While the Department appreciates and supports the addition of these measures, current golden eagle experts from the Department and U.S. Fish and Wildlife suggest a standard 4,000-foot buffer approach may not always lead to adequate buffer distances to prevent direct mortality or other significant impact to this species. In addition, nest occurrence does not necessary predict mortality risk from turbine strikes (Service, 2009 and Hunt 2009). Resident and nesting birds adjacent to wind projects are not the only variable when determining risk to golden eagles. Transient and juvenile bird behavior is also important as these individuals are typically the eagles killed by wind turbines. The Department would typically recommend proponents conduct individual eagle point count and nest surveys for each proposed project in areas known to support eagles. Because the proposed ministerial permit process does not require this level of analysis, the Department recommends a minimum one-mile buffer be established from each nest known to be active within the last five years to further

eagle nest data utilized by the County be comprehensive to the County and should be updated regularly to maximize avoidance to golden eagles.

Projects Consistency with the County's MSCP

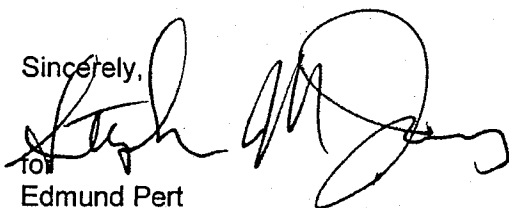
The Department recommends the County and the Department continue to discuss the potential impacts to the County's Natural Community Conservation Plan [NCCP, also known as the Multiple Species Conservation Plan (MSCP)] permit. Currently, the County has an approved NCCP permit for South County (1998), but not for North County or East County (in-progress). Although the Department understands that the County has a current Ministerial permit process (pre-dating MSCP) that does allow for small projects to be approved County-wide, the Department is concerned that the cumulative increase in demand for wind generation resulting from recently enacted State and local renewable energy goals may not be covered under the County's MSCP and could potentially risk the Counties existing and future permits. The Department recommends that before any projects be considered ministerial and transfer Third Party beneficiary status under the MSCP, the County should include standard measures to ensure consistency with the existing and future MSCPs including, but not limited to: avoidance of narrow endemics; avoidance of nesting birds; a bird and bat study; mitigation for habitat impacts; an adaptive management plan for turbines that after installation are found to have a significant impact to covered species; and/or, excluding areas known to support sensitive species/populations critical to the plan to further minimize impact to covered species.

Project Tracking

The Department also recommends the Ordinance include a provision for tracking/inventorying all projects permitted under the new Ordinance. Copies of the tracking reports should be made available to the Department for review. For projects that are conveyed Third Party Beneficiary Status in the adopted South County MSCP, the tracking should be included in the County's MSCP annual report.

We appreciate the opportunity to continue to coordinate with the County regarding the proposed Wind Energy Zoning Ordinance changes, as needed. If you have any questions or comments regarding this letter, please contact Erinn Wilson, Staff Environmental Scientist of the Department at (714) 968-0953 or email to ewilson@dfg.gov.

Sincerely,



for
Edmund Pert
Regional Manager
South Coast Region

References

W. Grainger Hunt, A Population Study of Golden Eagles in the Altamont Pass Wind Resource Area: Population Trend Analysis 1994-1997, by Predatory Bird Research Group, University of California Santa Cruz
U.S. Fish and Wildlife Service, Final Environmental Assessment Proposal to Permit Take Provided under the Bald and Golden Eagle Protection Act, April 2009, Federal Register

cc: State Clearinghouse, Sacramento

Mr. Matthew Schneider
April 12, 2012
Page 5 of 5

ec: Bill Condon, DFG, Sacramento
Stephen M. Juarez, DFG, San Diego
Randy Rodriguez, DFG, San Diego
Paul Schlitt, DFG, San Diego
Erinn Wilson, DFG, San Diego
Susan Wynn, US Fish and Wildlife Service, Carlsbad
Doreen Stadlander, Fish and Wildlife Service, Carlsbad

Jones, Cheryl

From: Rich Volker [r.volker@cox.net]
Sent: Thursday, April 12, 2012 2:20 PM
To: Jones, Cheryl
Cc: Schneider, Matthew
Subject: Reject the Proposed Wind Ordinance

#5

Dear SD County Planning Commissioners:

This correspondence is to express my concerns about the County's Wind Ordinance as proposed which is on calendar to be considered by the Planning Commission tomorrow, April 13, 2012. I am unable to appear and testify due to a calendar conflict, but I'm requesting that you reject the "Ordinance" as proposed principally for reason that the dBC noise standards, including the accompanying setback requirements as required under the proposed Ordinance, will virtually eliminate significant wind energy development in San Diego County.

The proposed dBC noise standards, if adopted, would be the most restrictive in California and would result in SD County establishing itself as unfriendly to meaningful renewable energy projects – an terribly unfortunate consequence given the County's unique and abundant renewable energy natural resources. The proposed dBC noise standards are not supported by any good science and, in fact, lack a recognized or accepted scientific basis. Unless the proposed Ordinance is modified to include dBC noise standards that are more supportable and reasonable for wind energy development, the proposed Ordinance will stop development of all of the currently planned projects – the proposed Ordinance standing alone would make those projects economically unfeasible for the developers. If the Ordinance were to be adopted as currently proposed, developers of those projects would then look to areas outside of SD County for wind project development, a result contrary to the expressed goal of the County Board of Supervisors to promote renewable green energy in San Diego County. East San Diego County is known to be and has been confirmed as one of the best wind energy development areas in the US, but unfortunately is also among the most economically deprived areas in the County. Wind energy development projects currently targeted for the area will result in substantial economic benefit for East County communities and residents (jobs, increased tax revenues, etc.) if allowed to be brought to completion.

Accordingly, I am requesting that the Ordinance be rejected as currently proposed with your recommendation to Staff that the dBC noise standards be re-worked and modified to more reasonable levels that will allow for wind energy development in the County to move forward. Thank you for your consideration of the foregoing and my request in this regard.

Rich Volker



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
Carlsbad Fish and Wildlife Office
6010 Hidden Valley Road, Suite 101
Carlsbad, California 92011



In Reply Refer To:
FWS-SDG-12B0055-13TA0024

NOV 16 2012

San Diego County Board of Supervisors
Attn: Clerk of the Board of Supervisors
1600 Pacific Highway, Room 402
San Diego, California 92101

Subject: Zoning Ordinance Amendment Related to Wind Energy Systems Regulations (POD10-007), San Diego County, California.

Dear Members of the Board of Supervisors:

We have reviewed the County of San Diego's (County) proposed zoning ordinance amendment that provides an updated set of definitions, procedures, and standards for review and permitting of wind turbines and meteorological testing (MET) facilities. We previously provided comments on the draft Environmental Impact Report and General Plan Amendment for the Wind Energy Zoning Ordinance in a letter dated December 20, 2011. Although the County has addressed many of the issues we raised in our letter, we remain concerned regarding the potential impacts to golden eagles (*Aquila chrysaetos*) from the construction and operation of wind turbines. The golden eagle is protected under the Migratory Bird Treaty Act (MBTA) and is afforded additional protection by the Bald and Golden Protection Act (BGEPA). Both the MBTA and BGEPA are administered by the U.S. Fish and Wildlife Service (Service). We request that the amendment to the County's Wind Energy Ordinance increase the proposed setback distance for small wind turbine placement in order to minimize potential impacts to golden eagles.

For small wind turbines, the amended ordinance would require that "No part of a wind turbine shall be closer than 4000 feet of a known golden eagle nest." While we support the requirement for a setback, we recommend the County increase the setback distance to 10,560 feet (2 miles) in order to minimize the risk to golden eagles from wind turbine operations. Our recommendation is based on our draft Eagle Conservation Plan Guidance (draft Guidance) dated January 2011. The draft Guidance is intended to assist parties to avoid, minimize, and mitigate adverse effects to bald and golden eagles. The draft Guidance includes a general approach to assess the risk to eagles from wind energy projects. Key to this assessment is identifying "important eagle-use areas" which the Service defines as "an eagle nest, foraging area, or communal roost site that eagles rely on for breeding, sheltering, or feeding, and the landscape features surrounding such nest, foraging area, or roost site that are essential for the continued viability of the site for breeding, foraging, or sheltering eagles" (USFWS 2009). Wind energy projects that overlap important eagle use areas may pose a risk to eagles either through direct mortality by collision (Hunt 2002, Krone 2003, Chamberlain *et*

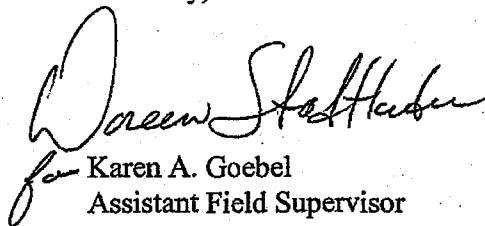
al. 2006) or disturbance from construction and maintenance activities which can result in a loss of productivity.

For a specific project, the draft Guidance recommends very detailed studies of eagles within 10 miles of a proposed wind turbine project. This type of analysis is not feasible since the proposed amendment to the zoning ordinance does not address specific project sites but rather is meant to provide criteria for future small wind turbine placement. Thus, we have based our recommended setback distance by calculating the mean inter-nest distance^a for all currently known eagle nests within the County which is approximately 4 miles. The draft Guidance recommends using half the mean inter-nest distance as the radius from known nests to predict the areas of highest risk to eagles from proposed wind energy projects (USFWS 2012). Based on this assessment, wind turbines located within a 2 mile or 10,560-foot radius of a golden eagle nest are predicted to be of highest risk to eagles. Hence, our recommendation to increase the setback distance to 10,560 feet for small wind turbine projects. Please note that this recommendation should not be applied to large turbine projects as these projects would be subject to site specific analyses.

We recognize that our recommended setback distance will encompass a larger area then currently proposed by the amendment but believe the greater set back is warranted to minimize the risk to golden eagles from small wind turbine placement within the County. Should a small wind turbine project be proposed within the setback distance, we are available to provide technical assistance to project applicants for site specific evaluations. Based on our review of the topography, surrounding land uses, and the status of the adjacent eagle nest(s), we may be able to waive the 10,560-foot radius setback for certain small wind turbines.

We appreciate the opportunity to comment on the proposed amendment to the wind energy systems regulations. If you have any questions, please contact Susan Wynn of this office at 760-431-9440, extension 216.

Sincerely,



Karen A. Goebel
Assistant Field Supervisor

cc:

Steve Juarez, California Department of Fish and Game, San Diego, CA
Matthew Schneider, Department of Planning and Development Services
Tom Dietsch, USFWS, Migratory Bird Program, Carlsbad, CA

^a The average inter-nest distance is the average of the distances between each nest and the closes neighboring nest detected (USFWS 2011).

Literature Cited

- Chamberlain, D. E., M. R. Rehfisch, A. D. Fox, M. Desholm, and S. J. Anthony. 2006. The effect of avoidance rates on bird mortality predictions made by wind turbine collision risk models. *Ibis* 148:198-202.
- Hunt, G. 2002. Golden eagles in a perilous landscape: predicting the effects of mitigation for wind turbine blade-strike mortality. California Energy Commission Report P500-02-043F. Sacramento, California, USA.
- Krone, O. 2003. Two white-tailed sea eagles (*Haliaeetus albicilla*) collide with wind generators in northern Germany. *Journal of Raptor Research* 37:174-176.
- U.S. Fish and Wildlife Service (USFWS). 2009. Eagle permits: take necessary to protect interests in particular localities. *Federal Register* 74(175):46836-46879.
- U.S. Fish and Wildlife Service (USFWS). 2012. Draft eagle conservation plan guidance module 1 – land-based wind energy technical appendices. August.

April 10, 2012

Planning Commission
County of San Diego
5201 Ruffin Rd, Suite B
San Diego, CA 92123

RE: Wind Energy Zoning Ordinance Amendment (Hearing Date, April 13, 2012)

Dear Chairman Pallinger and Members of the Commission:

The Endangered Habitats League (EHL) is pleased to submit written testimony regarding the Wind Energy Ordinance. EHL is Southern California's only regional conservation group, and a long-term stakeholder in County planning efforts.

We submitted extensive comments on the DEIR for the ordinance amendments, including from a biologist with special expertise in this subject. In the present testimony, we outline the aspects of the proposed ordinance we support as well as areas for improvement. Underlying our remarks is the belief that for property owners seeking electricity generation on site, rooftop solar panels *rather than turbines* are the least environmentally harmful and probably most cost effective option.

Wind energy presents a conundrum. While good from a greenhouse gas standpoint, turbines – both large and small, as defined in the ordinance – will *predictably* kill birds and bats over their entire life span. Furthermore, studies at Altamont Pass have shown that “small” turbines – here defined as up to 80 feet in height – may have impacts equivalent to “large” ones, due to the overarching importance of siting factors.

Central to your decision-making is that studies show that a small percentage of wind turbines cause *disproportionate* mortality. *By appropriately conditioning turbines, particularly in regard to siting, we can at least eliminate the worst offenders.* However, in its determination that small turbines should be permitted ministerially, the County has severely constrained the options for reducing impacts.

Within these constraints, the proposed ordinance – including modifications in response to comments received – goes a long way toward eliminating “bad actor” small turbines. This progress is commended (though additional needed steps will be identified below). EHL thus *supports* the proposed conditions listed below, all of which are necessary under CEQA as feasible mitigation measures. We note, however, that some jurisdictions, such as Marin County, go much further, and require full biological studies for “small” turbines.

- Setbacks from transmission lines and towers (where birds perch)
- Setbacks from riparian areas and wetlands using the surrogate of “blue line” USGS maps for watercourses and water bodies
- Setbacks from known golden eagle nests
- Setbacks from known bat roosting sites (with modification suggested below)
- Avoidance of ridgelines
- Construction without guy wires (which are perching sites and collision hazards)
- Sole use of California Energy Commission-approved turbine models
- Disturbance limits

Areas for improvement are described below, *all of which are feasible mitigation measures under CEQA to reduce significant environmental impacts:*

EHL supports adoption of the “Limited Small Wind Turbine Alternative” which means that only already disturbed areas will be used for construction rather than pristine habitat areas.

We request clarifying language for the topographic siting aspect, which is *the* most crucial factor for reducing bird and bat deaths and injuries. According to the draft ordinance, “Small wind turbines towers shall not be located on ridgelines.” Ridgelines are defined as, “The plateau or maximum elevation which extends along the top of Steep Slope Lands.” It is important to ensure that “saddles” –which are dips along a ridgeline that funnel birds and bats – are similarly prohibited from turbine placement. Also, to realize the intent of the ridgeline prohibition, the full height of the turbine blade should not encroach into the ridgeline or saddle air space. Thus, to provide clarity to applicants and DPLU counter staff, additional language should be added for saddles and airspace:

Saddle: A dip or lower area along a ridgeline between two higher points.

Ridgelines and Saddles. Small wind turbines towers shall not be located on ridgelines and associated saddles. Turbine blades shall not encroach into the airspace above ridgelines and associated saddles.

The language regarding setbacks from known bat roosts should be modified to eliminate the term “sensitive,” which has a particular *legal* meaning within the context of CEQA and is not appropriate to an ordinance that, on a *policy* level, should protect all bats – rare or still relatively common – from unnecessary killing. Little is known about San Diego’s bat populations, and we don’t want to turn “non-sensitive” species into “sensitive” ones by locating turbines too close to roosts. In addition, as not all information from the California Natural Diversity Database is mapped, and because the San Diego Natural History Museum is also an important source, the following changes are recommended:

Significant roost sites for ~~sensitive~~ bat species as ~~mapped on~~ obtained from the California Natural Diversity Database and San Diego Natural History Museum.

Both eagle nest and bat roost data should be periodically updated, of course.

The proposed ordinance proposes to *increase* from one to three the number of small turbines per parcel permitted on a ministerial basis. Given the admittedly significant and unavoidable biological impacts of these devices, it is a feasible mitigation measure to leave unchanged the *status quo* of a single ministerial turbine per parcel.

The ordinance particularly needs improvement to avoid prejudicing the County's adopted Multiple Species Conservation Program (MSCP). As you know, the MSCP provides for streamlined development permitting and ESA compliance through creation of a habitat reserve system. Wind turbines are not a "covered activity" under the MSCP permits, and turbine impacts to bird and bat species were not analyzed in the MSCP environmental documents (see U.S. Fish and Wildlife Service comment letter).

The County responds that one turbine is currently allowed ministerially per legal lot within MSCP "Preapproved Mitigation Area," or PAMA, and this would not change under the proposed ordinance. However, the DEIR *itself* determines that impacts from small turbines are significant and unavoidable for wildlife movement including "bird and bat flight paths." (DEIR at 2.4-37) The turbines similarly cause significant and unavoidable impacts to "candidate, sensitive or special-status species due to removal of areas of sensitive habitat and bird or bat strikes." (DEIR, Executive Summary) Given these findings, the County presents no substantial information to support its contention that simply requiring discretionary review for greater than one turbine per parcel within PAMA "will ensure that the Wind Energy Ordinance does not conflict with the goals of the MSCP." (Response to Comment I-11)

In order to protect the MSCP, we *strongly* recommend that *all* turbines within PAMA be subject to a discretionary Administrative Permit. However, as a compromise to still fit within a ministerial process, an application for a single turbine within PAMA could alternatively show that the conditions enunciated in the ordinance, plus any other steps identified by staff, have been applied so as to avoid MSCP conflicts. (An Administrative Permit would, of course, still be required for more than one turbine per parcel within PAMA.) It is certainly not worth jeopardizing the MSCP permits through uncovered impacts to covered species.

Regarding large turbines, the County relies upon the discretionary MUP process and in particular upon the fact that the California Energy Commission Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development (CEC Guidelines) will be applied during CEQA as part of the County Guidelines for Determining Significance for Biological Resources. *This is insufficient.* The CEC Guidelines, which are *absolutely crucial* to reducing bird and bat mortality, are otherwise voluntary. And deferring to the CEQA process is a far cry from actually ensuring that they will be followed, as under CEQA, projects with significant impacts can nonetheless proceed with "over-riding findings."

As it appears the County's *intent* is indeed to respect the best available guidance -- that is, CEC's -- it is *wholly feasible* for the County to simply *require* large turbine conformance to the most recent formulation of these standards. Handing off to the "game" of CEQA compliance is the wrong answer if certainty for all parties is a desired outcome.

To summarize, and to comply with CEQA, we recommend the following improvements to build upon the progress to date:

- Adopt the Limited Small Wind Turbine Alternative
- Clarify ridgeline language as to avoidance of topographic saddles and air space encroachment
- Eliminate the qualifier "sensitive" from the bat roost setback provision and expand the sources of data
- Retain the *status quo* of a single ministerial small turbine per non-PAMA parcel
- For a single turbine within PAMA, require an Administrative Permit, or alternatively, a showing that the conditions as applied, plus any additional measures identified by staff, result in turbine height and placement that will not prejudice the MSCP
- Incorporate the "most recent CEC Guidance" into the ordinance for large turbines

Thank you for considering our views.

Yours truly,

Dan Silver, MD
Executive Director

July 18, 2012

VIA ELECTRONIC MAIL AND FACSIMILE

Chairman David Pallinger
County of San Diego Planning Commission
5201 Ruffin Rd, Suite B
San Diego, CA 92123

RE: Wind Energy Zoning Ordinance Amendment (Item 1, July 20, 2012)

Dear Chairman Pallinger and Members of the Commission:

The Endangered Habitats League (EHL) is pleased to submit additional written testimony regarding the Wind Energy Ordinance. EHL is Southern California's only regional conservation group, and a long-term stakeholder in County planning efforts.

Our comments are limited to the biological aspects of turbines, noting that the "small" turbines, according to studies at Altamont pass, may have impacts on wildlife equivalent to "large" ones. Our comments are also based on the availability of rooftop solar as an environmentally and probably more cost-effective option. We will not reiterate all past testimony but first summarize previous but non-acted upon recommendations for small turbines, then comment on a new and highly unwise approach suggested for the MSCP, and finally reiterate our recommendation on the MUP process for large turbines regarding biology.

1. Feasible additional mitigation measures

Areas for improvement are described below, *all of which are feasible mitigation measures under CEQA* to reduce significant environmental impacts:

- a) *EHL supports adoption of the "Limited Small Wind Turbine Alternative" which means that only already disturbed areas will be used for construction rather than pristine habitat areas.*
- b) *We request clarifying language for the topographic siting aspect, which is the most crucial factor for reducing bird and bat deaths and injuries.*

According to the draft ordinance, "Small wind turbines towers shall not be located on ridgelines." Ridgelines are defined as, "The plateau or maximum elevation which extends along the top of Steep Slope Lands." It is important to ensure that "saddles" –

which are dips along a ridgeline that funnel birds and bats – are similarly prohibited from turbine placement. Also, to realize the intent of the ridgeline prohibition, the full height of the turbine blade should not encroach into the ridgeline or saddle air space. Thus, to provide clarity to applicants and DPLU counter staff, additional language should be added for saddles and airspace:

Saddle: A dip or lower area along a ridgeline between two higher points.

Ridgelines and Saddles. Small wind turbines towers shall not be located on ridgelines and associated saddles. Turbine blades shall not encroach into the airspace above ridgelines and associated saddles.

- c) *The language regarding setbacks from known bat roosts should be modified to eliminate the term “sensitive,” which has a particular legal meaning within the context of CEQA.*

Use of a technical CECA term is not appropriate to an ordinance that, on a *policy* level, should protect all bats – rare or still relatively common – from unnecessary killing. Little is known about San Diego’s bat populations, and we don’t want to turn “non-sensitive” species into “sensitive” ones by locating turbines too close to roosts. In addition, as not all information from the California Natural Diversity Database is mapped, and because the San Diego Natural History Museum is also an important source, the following changes are recommended:

Significant roost sites for sensitive bat species as mapped on obtained from the California Natural Diversity Database and San Diego Natural History Museum.

- d) *Both eagle nest and bat roost data should be periodically updated, rather than just eagle data as currently proposed.*
- e) *The status quo of a single ministerial permit per parcel should be maintained.*

The proposed ordinance proposes to *increase* from one to three the number of small turbines per parcel permitted on a ministerial basis. Given the admittedly significant and unavoidable biological impacts of these devices, it is a feasible mitigation measure to leave unchanged the *status quo* of a single ministerial turbine per parcel.

3. MSCP issues

Now “on the table” is a proposal to allow the *construction* of small turbines within the MSCP under the County’s “take” permits, but to sever the *operation* of said turbines from the construction. “Take” authorization for covered species would not be provided for operation. This approach is wrong.

It is the County’s responsibility to fully implement its *own* MSCP. It should not create conflicts for citizens by leaving them at risk for ongoing violations of the state and

federal Endangered Species Acts as a result of operationally non-compliant activities. Also, in our previous comments, we outlined the problem under CEQA in allowing activities with known significant impacts to covered species to occur within the MSCP without providing substantial evidence that MSCP goals will not suffer. These same acknowledged impacts may lead to the County's violation of its own MSCP permits.

The underlying problem is that the wind turbines *were not addressed* by the MSCP and are therefore *not* a covered activity. Rather than being straightforward about this, the County is proposing a jerry-rigged answer that is anything but a real solution. In order to protect both the MSCP *and* property owners, we recommend that small turbines be prohibited within PAMA. As a *compromise*, we recommend that *all* turbines within PAMA be subject to a discretionary Administrative Permit, so that siting and other factors are considered on a more detailed basis than possible at the DPLU counter.

4. The MUP process for large turbines should incorporate guidance from the California Energy Commission.

Regarding large turbines, the County relies upon the MUP process and in particular upon the fact that the California Energy Commission Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development (CEC Guidelines) will be applied during CEQA as part of the County Guidelines for Determining Significance for Biological Resources. *This is insufficient.* The CEC Guidelines, which are *crucial* to reducing bird and bat mortality, are otherwise voluntary. And deferring to the CEQA process is a far cry from actually ensuring that they will be followed, as under CEQA, projects with significant impacts can nonetheless proceed with "over-riding findings."

As it appears the County's *intent* is indeed to respect the best available guidance – that is, CEC's – it is *wholly feasible* for the County to simply *require* large turbine conformance to the most recent formulation of these standards. Handing off to the "game" of CEQA compliance is the wrong answer if certainty is a desired outcome.

5. Summary of recommendations

- Adopt the Limited Small Wind Turbine Alternative
- Clarify ridgeline language as to avoidance of topographic saddles and air space encroachment
- Eliminate the qualifier "sensitive" from the bat roost setback provision and expand the sources of data
- Retain the *status quo* of a single ministerial small turbine (except within PAMA)
- Within PAMA, prohibit small turbines, or require an Administrative Permit for all turbines
- Incorporate the "most recent CEC Guidance" into the ordinance for large turbines

Thank you again for considering our views.

Yours truly,

Dan Silver, MD
Executive Director

April 10, 2012

Planning Commission
County of San Diego
5201 Ruffin Rd, Suite B
San Diego, CA 92123

RE: Wind Energy Zoning Ordinance Amendment (Hearing Date, April 13, 2012)

Dear Chairman Pallinger and Members of the Commission:

The Endangered Habitats League (EHL) is pleased to submit written testimony regarding the Wind Energy Ordinance. EHL is Southern California's only regional conservation group, and a long-term stakeholder in County planning efforts.

We submitted extensive comments on the DEIR for the ordinance amendments, including from a biologist with special expertise in this subject. In the present testimony, we outline the aspects of the proposed ordinance we support as well as areas for improvement. Underlying our remarks is the belief that for property owners seeking electricity generation on site, rooftop solar panels *rather than turbines* are the least environmentally harmful and probably most cost effective option.

Wind energy presents a conundrum. While good from a greenhouse gas standpoint, turbines – both large and small, as defined in the ordinance – will *predictably* kill birds and bats over their entire life span. Furthermore, studies at Altamont Pass have shown that “small” turbines – here defined as up to 80 feet in height – may have impacts equivalent to “large” ones, due to the overarching importance of siting factors.

Central to your decision-making is that studies show that a small percentage of wind turbines cause *disproportionate* mortality. *By appropriately conditioning turbines, particularly in regard to siting, we can at least eliminate the worst offenders.* However, in its determination that small turbines should be permitted ministerially, the County has severely constrained the options for reducing impacts.

Within these constraints, the proposed ordinance – including modifications in response to comments received – goes a long way toward eliminating “bad actor” small turbines. This progress is commended (though additional needed steps will be identified below). EHL thus *supports* the proposed conditions listed below, all of which are necessary under CEQA as feasible mitigation measures. We note, however, that some jurisdictions, such as Marin County, go much further, and require full biological studies for “small” turbines.

- Setbacks from transmission lines and towers (where birds perch)
- Setbacks from riparian areas and wetlands using the surrogate of “blue line” USGS maps for watercourses and water bodies
- Setbacks from known golden eagle nests
- Setbacks from known bat roosting sites (with modification suggested below)
- Avoidance of ridgelines
- Construction without guy wires (which are perching sites and collision hazards)
- Sole use of California Energy Commission-approved turbine models
- Disturbance limits

Areas for improvement are described below, *all of which are feasible mitigation measures under CEQA to reduce significant environmental impacts:*

EHL supports adoption of the “Limited Small Wind Turbine Alternative” which means that only already disturbed areas will be used for construction rather than pristine habitat areas.

We request clarifying language for the topographic siting aspect, which is *the* most crucial factor for reducing bird and bat deaths and injuries. According to the draft ordinance, “Small wind turbines towers shall not be located on ridgelines.” Ridgelines are defined as, “The plateau or maximum elevation which extends along the top of Steep Slope Lands.” It is important to ensure that “saddles” –which are dips along a ridgeline that funnel birds and bats – are similarly prohibited from turbine placement. Also, to realize the intent of the ridgeline prohibition, the full height of the turbine blade should not encroach into the ridgeline or saddle air space. Thus, to provide clarity to applicants and DPLU counter staff, additional language should be added for saddles and airspace:

Saddle: A dip or lower area along a ridgeline between two higher points.

Ridgelines and Saddles. Small wind turbines towers shall not be located on ridgelines and associated saddles. Turbine blades shall not encroach into the airspace above ridgelines and associated saddles.

The language regarding setbacks from known bat roosts should be modified to eliminate the term “sensitive,” which has a particular *legal* meaning within the context of CEQA and is not appropriate to an ordinance that, on a *policy* level, should protect all bats – rare or still relatively common – from unnecessary killing. Little is known about San Diego’s bat populations, and we don’t want to turn “non-sensitive” species into “sensitive” ones by locating turbines too close to roosts. In addition, as not all information from the California Natural Diversity Database is mapped, and because the San Diego Natural History Museum is also an important source, the following changes are recommended:

Significant roost sites for sensitive bat species as mapped on obtained from the California Natural Diversity Database and San Diego Natural History Museum.

Both eagle nest and bat roost data should be periodically updated, of course.

The proposed ordinance proposes to *increase* from one to three the number of small turbines per parcel permitted on a ministerial basis. Given the admittedly significant and unavoidable biological impacts of these devices, it is a feasible mitigation measure to leave unchanged the *status quo* of a single ministerial turbine per parcel.

The ordinance particularly needs improvement to avoid prejudicing the County's adopted Multiple Species Conservation Program (MSCP). As you know, the MSCP provides for streamlined development permitting and ESA compliance through creation of a habitat reserve system. Wind turbines are not a "covered activity" under the MSCP permits, and turbine impacts to bird and bat species were not analyzed in the MSCP environmental documents (see U.S. Fish and Wildlife Service comment letter).

The County responds that one turbine is currently allowed ministerially per legal lot within MSCP "Preapproved Mitigation Area," or PAMA, and this would not change under the proposed ordinance. However, the DEIR *itself* determines that impacts from small turbines are significant and unavoidable for wildlife movement including "bird and bat flight paths." (DEIR at 2.4-37) The turbines similarly cause significant and unavoidable impacts to "candidate, sensitive or special-status species due to removal of areas of sensitive habitat and bird or bat strikes." (DEIR, Executive Summary) Given these findings, the County presents no substantial information to support its contention that simply requiring discretionary review for greater than one turbine per parcel within PAMA "will ensure that the Wind Energy Ordinance does not conflict with the goals of the MSCP." (Response to Comment I-11)

In order to protect the MSCP, we *strongly* recommend that *all* turbines within PAMA be subject to a discretionary Administrative Permit. However, as a compromise to still fit within a ministerial process, an application for a single turbine within PAMA could alternatively show that the conditions enunciated in the ordinance, plus any other steps identified by staff, have been applied so as to avoid MSCP conflicts. (An Administrative Permit would, of course, still be required for more than one turbine per parcel within PAMA.) It is certainly not worth jeopardizing the MSCP permits through uncovered impacts to covered species.

Regarding large turbines, the County relies upon the discretionary MUP process and in particular upon the fact that the California Energy Commission Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development (CEC Guidelines) will be applied during CEQA as part of the County Guidelines for Determining Significance for Biological Resources. *This is insufficient.* The CEC Guidelines, which are *absolutely crucial* to reducing bird and bat mortality, are otherwise voluntary. And deferring to the CEQA process is a far cry from actually ensuring that they will be followed, as under CEQA, projects with significant impacts can nonetheless proceed with "over-riding findings."

As it appears the County's *intent* is indeed to respect the best available guidance – that is, CEC's – it is *wholly feasible* for the County to simply *require* large turbine conformance to the most recent formulation of these standards. Handing off to the “game” of CEQA compliance is the wrong answer if certainty for all parties is a desired outcome.

To summarize, and to comply with CEQA, we recommend the following improvements to build upon the progress to date:

- Adopt the Limited Small Wind Turbine Alternative
- Clarify ridgeline language as to avoidance of topographic saddles and air space encroachment
- Eliminate the qualifier “sensitive” from the bat roost setback provision and expand the sources of data
- Retain the *status quo* of a single ministerial small turbine per non-PAMA parcel
- For a single turbine within PAMA, require an Administrative Permit, or alternatively, a showing that the conditions as applied, plus any additional measures identified by staff, result in turbine height and placement that will not prejudice the MSCP
- Incorporate the “most recent CEC Guidance” into the ordinance for large turbines

Thank you for considering our views.

Yours truly,

Dan Silver, MD
Executive Director

From: Rich Volker [<mailto:r.volker@cox.net>]
Sent: Thursday, April 12, 2012 2:20 PM
To: Jones, Cheryl
Cc: Schneider, Matthew
Subject: Reject the Proposed Wind Ordinance

Dear SD County Planning Commissioners:

This correspondence is to express my concerns about to the County's Wind Ordinance as proposed which is on calendar to be considered by the Planning Commission tomorrow, April 13, 2012. I am unable to appear and testify due to a calendar conflict, but I'm requesting that you reject the "Ordinance" as proposed principally for reason that the dBC noise standards, including the accompanying setback requirements as required under the proposed Ordinance, will virtually eliminate significant wind energy development in San Diego County.

The proposed dBC noise standards, if adopted, would be the most restrictive in California and would result in SD County establishing itself as unfriendly to meaningful renewable energy projects – an terribly unfortunate consequence given the County's unique and abundant renewable energy natural resources. The proposed dBC noise standards are not supported by any good science and, in fact, lack a recognized or accepted scientific basis. Unless the proposed Ordinance is modified to include dBC noise standards that are more supportable and reasonable for wind energy development, the proposed Ordinance will stop development of all of the currently planned projects – the proposed Ordinance standing alone would make those projects economically unfeasible for the developers. If the Ordinance were to be adopted as currently proposed, developers of those projects would then look to areas outside of SD County for wind project development, a result contrary to the expressed goal of the County Board of Supervisors to promote renewable green energy in San Diego County. East San Diego County is known to be and has been confirmed as one of the best wind energy development areas in the US, but unfortunately is also among the most economically deprived areas in the County. Wind energy development projects currently targeted for the area will result in substantial economic benefit for East County communities and residents (jobs, increased tax revenues, etc.) if allowed to be brought to completion.

Accordingly, I am requesting that the Ordinance be rejected as currently proposed with your recommendation to Staff that the dBC noise standards be re-worked and modified to more reasonable levels that will allow for wind energy development in the County to move forward. Thank you for your consideration of the foregoing and my request in this regard.

Rich Volker

Dear County Planners:

Here are some last minute items for the Wind Ordinance consideration specific to an area I know well. It does not imply my concerns for some of the other areas as there are many. Most specifically to that end, I am opposed to changing Boulevards Plan. I perceive it as a violation of self government and democracy. It is unnecessary, inappropriate and will end up costing our county in controversy and potential suits.

It has taken a while to piece together the comment process as well as the intentions of this proposal. This is a very serious proposal so I hope you will take your time.

Some of this has only come to light very recently.

Please consider the recent photo:



Ten years ago the San Diego County Board of Supervisors endorsed the creation of the proposed Eagle Peak Wilderness as part of Senator Boxer's California Wild Heritage Act. The picture above is in the heart of the Sill Hill unit of that proposal as well as an existing IRA or Inventoried Roadless area. It is on a ridge that sits across Boulder Creek, pretty much in the middle of nowhere-that is to say, impeccably unspoiled, remote, rugged, and absolutely gorgeous.

It is also adjacent to the legacy Marston Ranch and the oldest Ranch in San Diego, the McCoy Ranch, on Boulder Creek Road. This waterfall cascades between Cuyamaca and Middle Peak over about 14 tiers and slides for over 800 feet. **253 -**

This is not the sole vista, in the area. In my opinion it is highly indicative of the region.—the WHOLE region. That is the region bounded by Descanso, Julian, and Ramona. The views are sweeping and breathtaking. There are a number of waterfalls close to 100 feet: Cedar Creek Falls, Three Sisters Falls, the San Diego River 100 Foot Falls, Mildred Falls, The Big 12 above, Cuyamaca falls just to the south, to name a few. There are cascades into Cedar Gorge during the wetter months nearly 400 feet. Additionally these streams are all gorgeous, wild and unspoiled from source to El Capitan Reservoir. Cedar Creek and Boulder Creek above are known protected Steelhead waters as well and it would follow that the San Diego River has high potential for Steel head as well. To the South, the Sweetwater also has known steelhead-a trout with a life cycle similar to a salmon given unrestricted ability to get to the ocean.

This is also a primary region for Golden Eagles, ducks, Bald Eagles, Hawks, and other raptures appearing on the migratory bird act.

It is a primary region for 23 species of bats. Our mining history has accommodated several species with mine caves for habitat.

You may recall the Wilderness legend, Geoffrey Smith referring to this as the "Crown Jewel " "Wilderness" or the Crown Jewel of San Diego.

This region, close to town-attainable for hiking even after work during the summer months, is about 60,000 to 70,000 acres of US Forest lands including few small in holdings. The ranches are mostly less than 300 acres and most are less than 150 acres and surrounded by forest. Anything in those in holdings will impact the surrounding forest.

Please consider the next several pages of excerpts compiled from Ryan Hensen, CalWild on the evaluation of IRA's in this area in the 2005 FEIS of the Cleveland Land Management Plan. They are now under reassessment. These projects will face the same issues and must be considered before spending public money, making any zone decisions, or compromising sensitive lands:

The National Environmental Policy Act (NEPA), 42 U.S.C. § 4321 et seq., and the Council on Environmental Quality's (CEQ) implementing regulations, 40 C.F.R. §§ 1500-1517, require that each federal agency prepare an Environmental Impact Statement (EIS) for every major federal action significantly affecting the environment. 42 U.S.C. § 4332(C). The purpose of an EIS is to inform the decision-makers and the public of the significant environmental impacts of the proposed action, means to mitigate those impacts, and reasonable alternatives that will have lesser environmental consequences. An EIS must assess the environmental impacts of the proposed action, including direct effects, indirect effects, and cumulative impacts. 40 C.F.R. §§ 1502, 1508.7-1508.8. NEPA also requires federal agencies to use high quality, accurate scientific information and ensure the scientific integrity of the analysis in an EIS. See 40 C.F.R. § 1500.1(b); 40 C.F.R. § 1502.24....

...the FS has utterly failed in the FEIS to examine the direct effects, indirect effects, and cumulative impacts of placing the majority of IRAs in zones allowing for such activities, despite the fact that some IRAs could lose their wilderness character over the life of the plans as a result. The only explanation for this failure is offered on page 422 of the *FEIS, Volume 2 (Appendices), LMPs, September, 2005* where the FS writes that "In all cases, project proposals that are located within the revised inventory of roadless areas will be analyzed for effects on roadless character during NEPA analysis including the full disclosure of those effects." ...

The possibility of subsequent NEPA documents fails to address the impacts of placing IRAs in zones where development and other activities are allowed. The FS must comply with NEPA "at the earliest possible time to insure that planning and decisions reflect environmental values." 40 C.F.R. § 1501.2. A project-by-project NEPA analysis will not and cannot address

the combined and cumulative regional and local environmental impacts of allowing such development to occur in the first place. As the FS concludes on page 1-15 in the *Forest Service Roadless Area Conservation FEIS, Volume 1, November, 2000*:

Regardless of how well informed individual decisions may be at the local level, any new road building in inventoried roadless areas still results in a loss of roadless characteristics. When local officials evaluate the impacts of their decision to build a road into a roadless area, the incremental effect of the decision is considered. However, when these individual decisions are aggregated over time...the resulting ecological and social outcomes resulting from the loss of roadless areas may become substantial.

The Forest Service Handbook (FSH) at 1909.12-92-1, 4.19(c)(5) states that a land and resource management plan must "Describe the potential environmental consequences of a wilderness and a nonwilderness recommendation." At FSH 1909.12-92-1, 4.19(c)(5)(b) the FS is required to:

Discuss the impact on the roadless area of a wilderness designation and the impact of each nonwilderness prescription. Show the social and economic effects in each case. Include mitigation, if any, for loss of wilderness characteristics and the effects on plant and animal communities....

It is not enough to make "conclusory" or "perfunctory references" to cumulative impacts or to continue to use the same boilerplate language throughout the EIS. *Natural Resources Defense Council v. Hodel*, 865 F.2d 288, 298-99 (D.C. Cir. 1988). Cumulative effects analysis requires "some quantified or detailed information. . ." *Neighbors of Cuddy Mountain v. U.S.F.S.*, 137 F.3d 1372, 1379 (9th Cir. 1998). "General statements about 'possible' effects and 'some risk' do not constitute a 'hard look' absent a justification regarding why more definitive information could not be provided." *Id.* at 1380.

Some of the issues that should have been studied, described and discussed for each alternative in the southern California FEIS (and listed from page 3-21 to 3-242 in the RAC FEIS) include:

- The projected amounts and impacts of road construction in IRAs.
- The costs associated with maintaining new roads in IRAs.
- The risks of reducing water quality in IRAs.
- Impacts to air resources from IRA development.
- Consequences of and for fire and fuels management in IRAs.
- Impacts of insects and disease in IRAs.
- Impacts to the size of roadless areas (as the RAC FEIS states at 3-136, "There is a positive relationship between size of an area protected from human disturbance and maintenance of biodiversity").
- Impacts to IRAs of development at various elevation distributions.
- Impacts to terrestrial animal habitat in IRAs, including fragmentation and connectivity, edge effects, habitat suitability and effectiveness, early successional habitat, game species and late-successional habitat.
- Impacts to aquatic animal habitat and species in IRAs, including fragmentation and connectivity, water hydrology and stream channel morphology, habitat complexity, water quality, pools, riparian vegetation, introduction of nonnative species and diseases and over-harvest and illegal introduction.
- Impacts to terrestrial and aquatic plant species in IRAs, including non-native invasives, habitat fragmentation and effects of temporary roads.
- Impacts to threatened, endangered, proposed and sensitive species in IRAs.
- Impacts to research, monitoring and reference landscapes in IRAs.
- Consequences for non-mechanized, mechanized and motorized recreation in IRAs.
- Impacts to scenic quality in IRAs.
- Consequences to heritage resources in IRAs.
- Impacts from IRA development on existing wilderness and the possibility of future wilderness designation.

More precisely, the FEIS failed to consider the impacts the preferred alternative and the other alternatives would have on the natural integrity, apparent naturalness, remoteness, solitude, special features, manageability, logical boundaries, and special places or values in the CNF IRAs as has been done by other national forests in Region 5. Thus, the effect of the proposed action on the wild character of the affected roadless areas was improperly studied in the FEIS (or more precisely, not studied at all) and therefore it does not satisfy the detailed analysis requirements set forth in 36 CFR 219.17.

To expand on one potential impact further, the (LMP) FEIS fails to explicitly evaluate the effect that zoning IRAs for road construction and other forms of development will have on the introduction of invasive species. It is well known that off-road vehicle activity, road construction, infrastructure construction and the like are principle causes for the introduction and spread of invasive species. Executive Order 13112 (February 3, 1999) puts a heavy burden on agencies whose activities may spread invasive species. It is a sad irony that the FS is devoting so much effort to eradication of one of the Chief's four big threats--invasive species--while at the same time failing to inform the decision process of its own activities which do not take proper account of prevention.

To make matters worse, what little information is offered in the FEIS is often quite contradictory. For example, the FEIS Volume 2 in Table 451 lists the Ladd IRA as 1C (roads allowed) while it is shown as 1B (roads not allowed) and 1C on the map in the *Land Management Plan Part 2, CNF Strategy*. In addition, No Name IRA is shown as 1B and 1C on the map while it is listed as 1B in the EIS. The San Mateo Canyon IRA is listed as 1C in the EIS and it is not even displayed on the map. Lastly, none of the "other undeveloped areas" are listed in the EIS or shown on the map. Neither the public, nor the Regional Forester can make informed decisions regarding roadless areas when contradictory information is coupled with an incomplete analysis. The FEIS and RODs thus fail to meet the standards set forth in the NEPA, 40 CFR Part 1500.2 (e) and Part 1500.1 (b) which require the federal government to ensure "that environmental information is available to public officials and citizens before decisions are made and before actions are taken," and that the information provided to public officials and citizens "must be of high quality."

As the foregoing discussion demonstrates, the effect of the proposed action on the wild character of the roadless areas mentioned above was improperly studied in the FEIS (or more precisely, not studied at all). Thus, the FEIS does not satisfy the detailed analysis requirements set forth in 36 CFR 219.17, as well as the requirement that agencies shall identify environmental effects and values in sufficient detail to make informed decisions (40 CFR 1501.2[b]).

During the forest planning process, the Forest Service must evaluate and consider roadless areas for recommendation as potential wilderness areas. 36 C.F.R. § 219.17(a). These areas may then be considered by Congress for their inclusion in the National Wilderness Preservation System, as provided by the Wilderness Act. 16 U.S.C. § 1131, et seq. The regulation suggests a two-step process, describing areas subject to evaluation in (a)(1) and providing significant issues for evaluation in (a)(2). *Id.* The FSH provides further guidelines for this two-step process of inventory and evaluation of roadless areas. FSH 1909.12, Ch. 7. In the wilderness evaluation phase, the FS decides which areas should be recommended for wilderness designation. The CNF's wilderness evaluations fail to meet NEPA requirements that the FS "assess the wilderness value of each area" and evaluate the impact of not recommending each area for wilderness designation. *California v. Block*, 690 F.2d 753, 764 (9th Cir. 1982); see also FSH 1909.12-7.25(1)(2).

The FS totally fails to consider the impact of non-wilderness management on "each area's wilderness characteristics and value." *Id.* The FS also fails to adequately assess each area's wilderness value. The FSH outlines the criteria for evaluating each potential wilderness area. "An area recommended as suitable for wilderness must meet the tests of capability, availability, and need." FSH 1909.12.7.2. Guidelines for determining if the character of an area is appropriate for wilderness designation are found primarily in the FSH under capability. FSH 1909.12.7.21 ("The capability of a potential wilderness is the degree to which that area contains the basic characteristics that make it suitable for wilderness designation without regard to its availability for or need as wilderness."). Availability is largely determined by capability. FSH 1909.12.7.22 ("All National

Forest System lands determined to meet wilderness capability requirements are generally available for consideration as wilderness."). Availability is also a function of need. FSH 1909.12.7.22 ("determination of availability is conditioned by the value of and need for the wilderness resource"). Contrary to the requirements of the FSH, the FS fails to consider all of the factors which enhance wilderness value and therefore an area's "capability" for wilderness designation.

Improper use of "sights and sounds" criteria

In its evaluations, the CNF largely relied upon "sights and sounds" criteria, rather than an area's undeveloped character, to decide whether or not IRAs should be recommended for wilderness designation. In so doing, the CNF acts contrarily to long-standing direction from Congress to avoid using sights, sounds and other external influences to judge an area's wilderness quality.

During Subcommittee Hearings for the 1978 Endangered American Wilderness Act Congress found that:

... many areas, including the Lone Peak [outside Salt Lake City] ..., received lower wilderness quality ratings because the Forest Service implemented a "sights and sounds" doctrine which subtracted points in areas where the sights and sounds of nearby cities (often many miles away) could be perceived from anywhere within the area. This eliminated many areas near population centers and has denied a potential nearby high quality wilderness experience to many metropolitan residents, and is inconsistent with Congress' goal of creating parks and locating wilderness areas in close proximity to population centers. The committee is therefore in emphatic support of the Administration's decision to immediately discontinue this "sights and sounds" doctrine. House Report 95-540, 95th Congress, July 27, 1977, page 5.

...During Senate hearings on the Endangered American Wilderness Act, Dr. M. Rupert Cutler, the Assistant Secretary of Agriculture, assured Senator Pete Domenici (R-NM) that "...there is no reference in the Wilderness Act to criteria for wilderness that includes such things as the sights, sounds, and smells of civilization which is a set of criteria which has been misapplied to wilderness areas" (Subcommittee on Parks and Recreation of the Committee on Energy and Natural Resources, United States Senate on S. 1180, September 19 & 20, 1977, Publication No. 95-88, Committee on Energy and Natural Resources, page 41).

Relevant to the photo above:

- Sill Hill IRA: Capability is rated as medium in part because urban areas can be seen from the IRA. This has no bearing on the area's undeveloped character. The capability rating for this area would have been higher had it been given a fair and appropriate evaluation. Neither the public, nor the Regional Forester can make informed decisions regarding roadless areas when the FEIS and ROD fail to meet the standards set forth in NEPA, 40 CFR Part 1500.2 (e) and Part 1500.1 (b) which require the federal government to ensure "that environmental information is available to public officials and citizens before decisions are made and before actions are taken," and that the information provided to public officials and citizens "must be of high quality."

(I was on this ridge last Sunday, it was in my opinion one of the most breathtaking areas in our county. If IMAX was doing a film on our Cuyamcas, I would take them there.)

- **Eagle Peak IRA:** The IRA's capability is rated as medium because difficulty and challenge are low in those portions where a trail is present, and difficulty and challenge are also low in the trackless portions of the area where there are no human-created routes. What perfect combination of trails and trackless areas must a roadless area have to achieve a high degree of challenge and adventure according to the CNF? Thick chaparral and other vegetation obviously offers great challenges to visitors seeking to travel cross-country. In contrast, the Angeles National Forest's IRA narratives repeatedly acknowledge this indisputable fact. For example, in the Red Mountain IRA narrative the ANF states that "Hampered by dense chaparral, cross-country exploring provides interesting challenges." The narratives repeat essentially the same point while describing the Salt Creek, Sespe-Frazier, Strawberry Peak, Tule and Fish Canyon IRAs. Lastly, the narrative mentions that there "are unclassified roads in the area," but later states that "There are currently no roads or trails within the IRA." Neither the public, nor the Regional Forester can make informed decisions regarding roadless areas when contradictory information is coupled with an incomplete analysis. The FEIS and ROD thus fail to meet the standards set forth in the NEPA, 40 CFR Part 1500.2 (e) and Part 1500.1 (b) which require the federal government to ensure "that environmental information is available to public officials and citizens before decisions are made and before actions are taken," and that the information provided to public officials and citizens "must be of high quality."

The 5,000 acre *recommendation* offered in the Wilderness Act is not a magic number. The key factor according to the FSH at 1909.12, 7.21(5) is whether the FS has the "...ability to manage an area as an enduring resource of wilderness, untrammelled by man, retaining its primeval character, and to protect and manage its natural character...Also consider such factors as size, shape, and juxtaposition to external influences." The evaluation document failed to discuss any of these considerations with the exception of external influences, and in that case it mentioned that the potential for conflict with activities outside the area is low. The capability rating for this area would have been higher had it been given a fair and appropriate evaluation. Neither the public, nor the Regional Forester can make informed decisions regarding roadless areas when the FEIS and ROD fail to meet the standards set forth in NEPA, 40 CFR Part 1500.2 (e) and Part 1500.1 (b) which require the federal government to ensure "that environmental information is available to public officials and citizens before decisions are made and before actions are taken," and that the information provided to public officials and citizens "must be of high quality."

... FSH 1909.12, 7.23 explains how the FS should evaluate the need for new wilderness areas in the forest planning process. The FEIS fails to fully explain the rationale behind zoning inventoried roadless areas for development instead of recommended wilderness. The CNF ROD (page 9) states "By managing these areas as Backcountry zones managers expect to have the flexibility to accommodate a range of uses such as mountain biking or hang-gliding, that are not permitted in designated wildernesses." However, the FEIS fails to demonstrate that there is a demand for these other activities in the inventoried roadless areas excluded from recommended wilderness designation. In fact, the FEIS is clear that wildlife viewing and hiking/walking are the two most popular activities in the southern California forests. The IRA analysis repeatedly states that there is a low need for wilderness management in the CNF's IRAs because of the low number of visitors in nearby existing wilderness areas. This assessment is inconsistent with the FEIS' observation on Page 266 that "Recreation use in southern California national forest wilderness is increasing and can affect wilderness values and resources, naturalness, wildness and solitude."

...Eagle Peak IRA: The needs analysis states that the "Eagle Peak IRA is among the key ecological areas identified for this region and is dominated by some of the best remaining occurrences of low-elevation ecosystems." However, the narrative failed to explain how plants and animals will be affected by the fact that 798 acres of this area are in the BC zone (where communication site construction, public woodcutting, commercial logging, "temporary" road construction, energy development, permanent road construction, new utility corridor construction, construction of buildings, mechanized vehicle use and off-road vehicle use are allowed), 1,227 acres are in the BCMUR zone (where communication site construction, commercial logging, "temporary" road construction, energy development, permanent road construction, new utility corridor construction, construction of buildings and mechanized vehicle use are allowed), and 4,435 acres are in the BCNM zone (where communication site construction, commercial logging, "temporary" road construction, energy development and mechanized vehicle use are allowed). The use of short, generic, and utterly unsupported reassurances about the future wellbeing of plants and animals in the face of the severe development threat posed by the zoning schemes described above does not under any circumstances constitute a complete and fair analysis. The need rating for this area would have been

higher had it been given a fair and appropriate evaluation. Neither the public, nor the Regional Forester can make informed decisions regarding roadless areas when the FEIS and ROD fail to meet the standards set forth in NEPA, 40 CFR Part 1500.2 (e) and Part 1500.1 (b) which require the federal government to ensure "that environmental information is available to public officials and citizens before decisions are made and before actions are taken," and that the information provided to public officials and citizens "must be of high quality."

... No Name: The needs analysis for the IRA states that the area supports a "high number of rare and vulnerable riparian species." However, the narrative failed to explain how plants and animals will be affected by the fact that 441 acres of this area are in the BC and DAI zones (where communication site construction, public woodcutting, commercial logging, "temporary" road construction, energy development, permanent road construction, new utility corridor construction, construction of buildings, mechanized vehicle use and off-road vehicle use are allowed), 923 acres are in the BCMUR zone (where communication site construction, commercial logging, "temporary" road construction, energy development, permanent road construction, new utility corridor construction, construction of buildings and mechanized vehicle use are allowed), and 3,524 acres are in the BCNM zone (where communication site construction, commercial logging, "temporary" road construction, energy development and mechanized vehicle use are allowed). The use of short, generic, and utterly unsupported reassurances about the future wellbeing of plants and animals in the face of the severe development threat posed by the zoning schemes described above does not under any circumstances constitute a complete and fair analysis. The need rating for this area would have been higher had it been given a fair and appropriate evaluation. Neither the public, nor the Regional Forester can make informed decisions regarding roadless areas when the FEIS and ROD fail to meet the standards set forth in NEPA, 40 CFR Part 1500.2 (e) and Part 1500.1 (b) which require the federal government to ensure "that environmental information is available to public officials and citizens before decisions are made and before actions are taken," and that the information provided to public officials and citizens "must be of high quality."

Sill Hill IRA: The needs analysis states that the coast horned lizard population is declining and yet it fails to explain how it and other plants and animals will be affected by the fact that 404 acres of this area are in the BC and DAI zones (where communication site construction, public woodcutting, commercial logging, "temporary" road construction, energy development, permanent road construction, new utility corridor construction, construction of buildings, mechanized vehicle use and off-road vehicle use are allowed) and 4,369 acres are in the BCNM zone (where communication site construction, commercial logging, "temporary" road construction, energy development and mechanized vehicle use are allowed). The use of short, generic, and utterly unsupported reassurances about the future wellbeing of plants and animals in the face of the severe development threat posed by the zoning schemes described above does not under any circumstances constitute a complete and fair analysis. The need rating for this area would have been higher had it been given a fair and appropriate evaluation. Neither the public, nor the Regional Forester can make informed decisions regarding roadless areas when the FEIS and ROD fail to meet the standards set forth in NEPA, 40 CFR Part 1500.2 (e) and Part 1500.1 (b) which require the federal government to ensure "that environmental information is available to public officials and citizens before decisions are made and before actions are taken," and that the information provided to public officials and citizens "must be of high quality."

Caliente IRA: The needs analysis states that the "Maintenance of unroaded, non-motorized conditions is one means of meeting the needs" of the many "rare and vulnerable botanical and wildlife species" found in the roadless area. However, the narrative failed to explain how plants and animals will be affected by the fact that 235 acres of this area are in the BC and DAI zones (where communication site construction, public woodcutting, commercial logging, "temporary" road construction, energy development, permanent road construction, new utility corridor construction, construction of buildings, mechanized vehicle use and off-road vehicle use are allowed) and 5,675 acres are in the BCNM zone (where communication site construction, commercial logging, "temporary" road construction, energy development and mechanized vehicle use are allowed). The use of short, generic, and utterly unsupported reassurances about the future wellbeing of plants and animals in the face of the severe development threat posed by the zoning schemes described above does not under any circumstances constitute a complete and fair analysis. The need rating for this area would have been higher had it been given a fair and appropriate evaluation. Neither the public, nor the Regional Forester can make informed decisions regarding roadless areas when the FEIS and ROD fail to meet the standards set forth in NEPA, 40 CFR Part 1500.2 (e) and Part 1500.1 (b) which require the federal government to ensure "that environmental information is available to public officials and citizens before decisions are made and before actions are taken," and that the information provided to public officials and citizens "must be of high quality."

As described in detail above, both NEPA and CEQA laws require clear readable unbiased descriptions of all areas that projects will impact. This was not done in the Wind Ordinance. The lone map for large wind is on an 8.5 X 11 scale page that is increasingly blurry as it is enlarged. It contains a overview map of the entire county with color coded wind feasible regions. These were produced by the National Renewable Energy Lab as models only. Surely they were never intended as a finished project. Do land owners live in fear now that their property will be rezoned via satellite? No field data went into their creations. There are very few labels. I had to spend several hours just to figure out where these zones are.

Well, I will tell you now about a couple of them in the region between Descanso, Ramona and Julian. These contain Rancho Alegria, the Marston Ranch, and the former Rutherford Ranch to name some, as well as the Daley Flat Area and a huge swath overlooking the San Diego River Gorge in the center and again at the head waters.

The Sierra Club did an informal study with the input of Devinheim (misspelled) Wind in 2009. They cited a number of other resources in that informal document created by an intern, all of which concluded that wind resources should not be placed near Riparian areas. All of the above areas are in or impact Riparian areas. Since this is a small region of the entire map it makes no sense to sacrifice any portion of it. It will not result in a significant plus to the Global Warming issue but it will deny San Diego of its "Crown Jewel".

Cedar Creek Falls is so popular that 500 people a day were showing up, when the Forest Service initiated formal public trails and management. —So popular that unfortunately they had to close it for a while. To take its place the public has been going in the hundreds to Three Sisters Waterfall one canyon over in Boulder Creek. I have seen the dozens of cars parked there myself. The hunting blogs are a buzz with hunters all over Boulder Creek and Eagle Peak Road in the last five years due to increased pig, turkey, deer, dove, and quail hunting. Indeed McGee Flat and Dead Man Flat and Temescal canyons have become the latest hunting heaven and Fish and Game had to close McGee Flat last weekend to regroup its management when someone put out food for turkeys. McGee Flat purchased only recently by the Forest Service protects an enormous stand of Engelmann Oaks, Golden Eagle Nests, and steelhead watershed. The San Diego River Park Foundation has successfully acquired several hundred acres of unspoiled legacy back county and a mailing list of over 80,000 people right across from Mildred Falls on Eagle Peak Road. Management of this region has had to struggle to keep up with the enormous popularity of the area. For good reason, it is all gorgeous and Geoff is right, it is our Crown Jewel.

Unfortunately the modelers of wind are not here. They have not been here, they could not have not seen much if any of this area. "much if any" is hardly NEPA compliant. I can document as of last week the US Forest Service has not been to the photo above. Their people are glowing, but they have not had the time and resources in the last decade to get onto the land. I participated in the Land Management Collaborative as part of a long Law Suit by a number of Environmental organizations over the 15 year Forest Management Plan that was released in late 2005. There were a number of times in that five month process that I had to correct the general geographic understanding because even the best of the agencies had not been able to field check the land.

You are suggesting wind zones, large wind zones with 450 foot wind mills on them on private in holdings in several places in this region. These need to be removed from your Ordinance. One cannot construct a 450 foot object in seriously rugged terrain without serious infrastructure such as cranes and roads, and continual maintenance. These are surrounded by Inventoried Roadless areas. They are but in holdings in a region that is largely managed by US Forest Service. When you drive up I-8 the signage even says "entering the Cleveland National Forest".

One of the responses to my other comments was, "remember these are only proposals and these have to go through our process." The smaller projects in this proposal actually are here because you want to eliminate that process. However you do not have any infrastructure around them, most especially the larger ones that can accommodate this

action. You are suggesting that we place met towers all over private lands next to IRAs in the forest without review. However NEPA does not allow this. NEPA says you must disclose make aware as soon into the process as possible. See Ryan's comments as well. The descriptions must be clear and unbiased enough for the public and the administrators to make an informed decision. That is not possible in this case because as I can attest several times over, the US Forest Service has not been there and does not necessarily have this information, *ibid* the legal issue above. (not to site anyone on the Forest –the current administrators are new-please, not about them, it's about our county and our lands) Per our lawsuit they are required now to do that work and are in the process of doing so. However I know for fact that they have not seen the areas that would have to be impacted by infrastructure such as the ones mentioned above, they have not been to. As a matter of fact to their credit, some of them attempted to last week and did not make it. I did get the Native Plant Society there and they are asking for much more review. There are also considerable Native American sites there. One of the major issues of the law suit now underway is that the scenic integrity was not properly evaluated. I can confirm this by conversations and emails that occurred during our collaborative and the conditions stated in the suit. On one occasion the forest Service confirmed an ongoing confusion over the word Inaja switching and confusing it to Inaja Reservation and Inaja Memorial Park in our communications. This confused two sub-watersheds and impacts both the head waters of the San Diego River as well as the most unspoiled , in fact almost untouched portions of Cedar Gorge next to the Inja Reservation.

Let's imagine you owned one of these ranches. Someone in another part of the country uses GIS to model wind and because you have a private island in the forest your property is targeted. The MET tower can be constructed without environmental review. Then and only then you decide to do an EIS to find out after two years of stress and controversy that all of the issues above are going to prevent construction. OR you are planning to railroad a project through anyway? NEPA is clear that this is not ok. You cannot get to these properties without Forest permitting through a NEPA process. What has to happen is both illegal and most definitely unethical.

And that is only the environmental part. There are many issues that must be disclosed that have not been and the Forest Service as we speak is addressing the deficiencies ordered by the 9th district Federal Court.

Further more, not only does NEPA make it clear that you must do the environmental review before any of these projects but also the final decision from the federal courts on IRA upheld that the IRA itself is the time when the EIS must be considered, and overruled the US Forest version that wanted it to be considered merely administrative. Likewise your ordinance as it is taken up in the Federal Forest would have to follow that precedent and not the one that says this is administrative until it happens. In the Forest according to the IRA rules it must follow NEPA as early as possible. That is public disclosure fully.

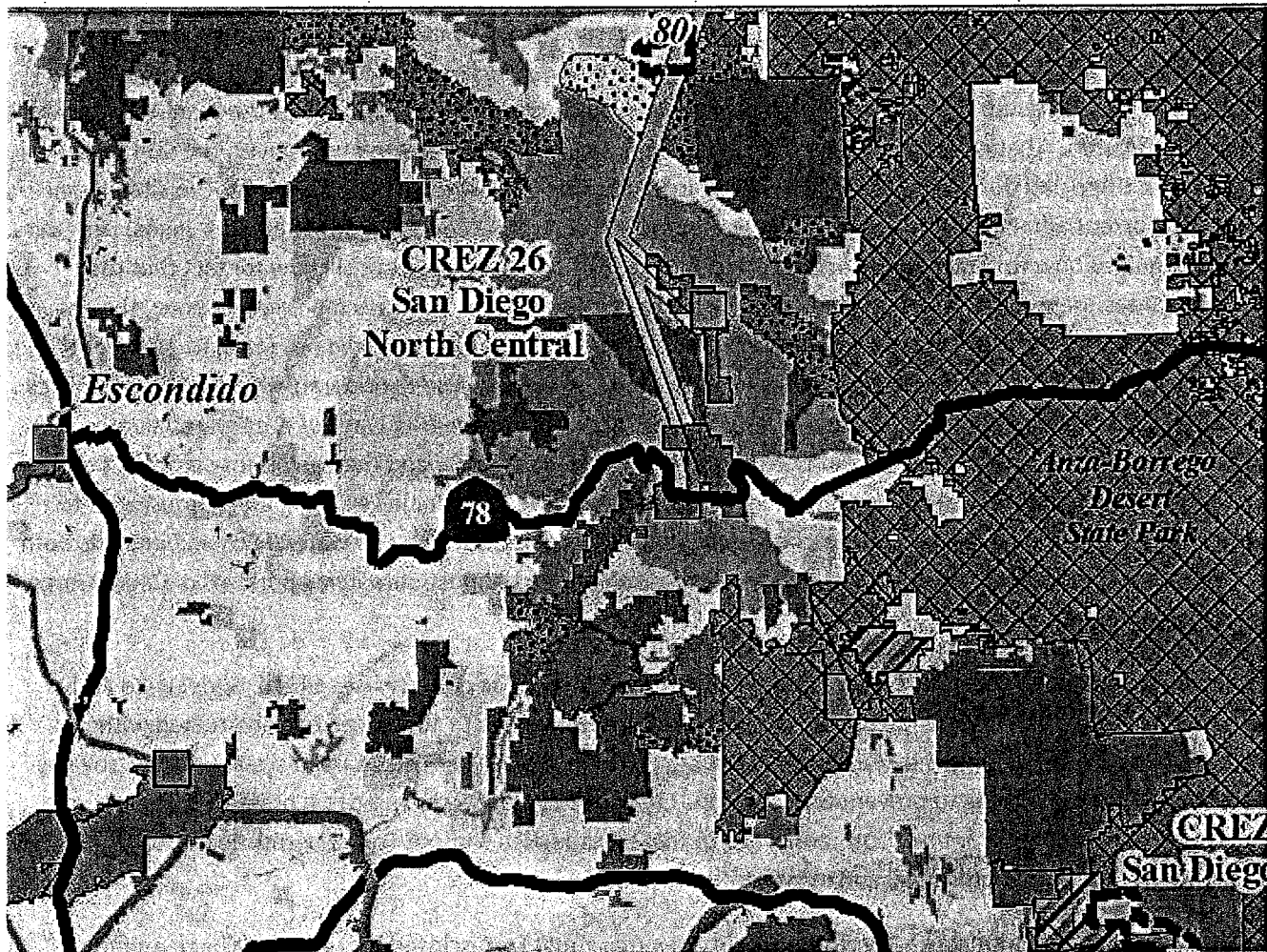
This definitely did not happen. See the following:

<http://www.energy.ca.gov/reti/documents/index.html>

Especially the following two:

<http://www.energy.ca.gov/2010publications/RETI-1000-2010-002/RETI-1000-2010-002-F.PDF>

http://www.energy.ca.gov/reti/documents/phase2B/CA_CREZ_Conceptual_Transmission_Segments_Phase_2B_final.pdf



In the conference by RETI in 2010 you will notice a man by the name of Carl Zichella touting the priority wind areas. I had not seen this until last fall. But Reti had been very busy. Most of San Diego has no idea they exist or what they were planning for us on our land. I forwarded to several groups. The Julian Planning group had not heard of RETI not before during or after the creation of the County plan, nor had Donna Tisdale who misses nothing nor had the US Forest Supervisor who logically would have been informed. No one. Why? Because Carl Zichella may be have been Carl Pope's energy advisor, and he may have been on RETI but he sure is not an elected official. He is at the National Resources Defense Council now but he left when members in the Sierra Club challenged the secrecy and lack of democracy in this process. Indeed it raises concern that members were manipulated out of basic federal rights to participate in this process that they believed was being done, while their leadership was investing in ways not disclosed to them. If it seems ironic that the Sierra Club that has been in suit after suit to enforce NEPA and CEQA did not abide by it themselves, you are in good company. I contend that these upper level environmental organizational leaders made decisions on behalf of all of us that we were never informed of nor could they have had adequate information to make them. If you will notice just last Friday the article in the LA Times about one of these decisions it will validate at least in a general way what happened.

<http://www.latimes.com/news/local/la-me-solar-green-20120406%2c0%2c1278620%2cfull.story>

I agree with this article, but I think the article sugar coated the issue. There is much more. I point out that some of these enviro representatives were also investing and getting grant money. A lot of money. They were reluctant **262 -**

down right rude and marginalizing if we attempted to input. This is directly in violation of federal law if they assume to know the data but refuse to take it but are designated to be providing it. It could be a violation of making false statements. If you proceed without assuring the legitimacy of these proposals you could be too. If these wind companies have had meetings with these organizations as far as advising and technical information they cannot participate in the Procurement process as well, as a bidder. Remember I mentioned that Devenheim (not spelled correctly) Wind did so with the Sierra Club in 2009. I was briefly away from my committee at the time and when I returned upon consulting with Donna Tisdale in horror we did not endorse the intern's project.

If they have gone beyond that to actually donate money in exchange for privileged support from orgs with consultation rights as perceived in the above article, the Sierra Club National and NRDC national had, they could be in more trouble for insider trading. If they knowingly marginalized members we potentially could add racketeering.

I think you should be taking the time to find out. This is costly to the tax payers and stressful to all. The result of destroying the "crown jewel" of San Diego thanks to potential negligence on the part of Sierra Club National would be crushing to this community, not to mention mind blowingly ironic.

They had not been to these areas, certainly not the one above with any ability to review assess and consult. Hence whatever criteria or data they provided, I challenge as not NEPA compliant.

It gets worse though.

Someone wanted this route very badly. VERY badly. It's not like SDG&E themselves don't have alternatives to get north. They, someone, associated with wind, right there, wants it right there. Unlike the perceived bullying of SDG&E, I perceive wind company affiliates that will not stop there. They tried to accuse people in Boulevard of threatening behavior and were proven wrong-they failed to notice the meetings were taped. Opps. They tried to slander us who love the forest too, too. I had law enforcement at my door one morning. The concern closed but not before I questioned them for printing in a font that was not largely used yet outside of large companies and agencies, though unconfirmed. During that time, I had a man watching me at 2 am through my windows in North Park, while working on my rental. Subsequently someone told my insurance agent that the house was abandoned. The usual addenda of voyeurs? It had been rented for two months. I've rebuild three engines when I had only rebuilt one in the last 20 years prior, on one the thermostat was in backwards. I heard multiple reports of contractors threatened if they found Indian artifacts during Sunrise assessments. I invited friends to my appeal who were later threatened and told they could not volunteer at the Palomar Fire Watch. (an independent tower) I would have been all too happy to forget these concerns, if I had not noticed another pattern.

Four people are dead. Yup. Over the last four years. They were not just articulate they were leaders at what they did and their focus was right under the general option D route where these in holdings would pass. They all died of reasonable causes but also under rather unusual circumstances that were never totally confirmed. Any one by itself would go unnoticed. They were all heart/nuero toxin like causes. Some of these new energy gods do have potential access to military items that could plausibly be used to get their opposition out of the way. Do I have a good imagination? I like to think so. Nevertheless, these four people, the ones I happen to be aware of, had collective leadership to have been a formidable opposition with excellent data, better than I could hope for, often better than the Forest Service, and right there. Now they are gone.

I hope this is not your legacy and vision for our community. As builders and environmentalists we come together and don't always agree. However, surely we can agree that there is no money or project worth sacrificing basic freedoms, civil rights and security over. This must be assured. I am most concerned that currently it is not.

Let's say under the bell curve there are a number of random things that happen. If the odds get out to the edges of that bell curve, the more likely stuff isn't just coincidence but has been acted upon by some outside influence indicating greater odds that something is not random but may have an influence behind it. Let's say that the odds that those leaders all passing away within three years of each other right there are low but not unheard of. Say maybe 20%. So an 80% chance that it's really just coincidence. Nevertheless, given a number of attacks by the new wind to bully in their projects I now have to worry, and be hyper vigilant. In America this is not ok. In San Diego where our military presence assures our freedom this is definitely not ok.

It's not hard to understand how it went unnoticed; but now that the issue is here, we have very lucrative projects in the billions collectively being proposed, people tempted with investments that have never studied investing or SEC and FTC laws before.

I told Michael Shames 4 years ago, that 700 million front loaded, as he liked to claim, was not enough to motivate Sunrise, and something else had to be afoot, something a power or two powers of 10 more lucrative. I was right. The 7000 page EIS for Sunrise did not clearly present this connected action according to the notes above. Only on a map at the end does it even hint that after all of that they may be wanting to come up Boulder Creek Road. This is not NEPA disclosure. Hinting is basically illegal in the world of NEPA. It's one or the other: If you know, you have to disclose, clearly. Clearly they did not. If you don't know than how is it on the map? I have yet to get this answer and I have tried and tried.

There is nothing here that I see that addresses protecting us from threats to us for speaking against them. There are federal whistleblower laws but this big money that comes to our door steps is not something we have had to consider. It is scary and high potential for organized crime and the violence that could accompany it. I do not want this culture in my community and I'm terrified that that is the door that is being opened wittingly or not. I would rather be poor and reading by candlelight than live under tyranny. I have very good company on this point all over our backcountry.

Due to the size of the money and potential for harm, there should be a plan to guard against it and respond to it. No oversight and boundaries seem to be in place specific enough to assure that individuals are protected from mal intent. It is an outlandish claim I know. But I've watched the circumstances and there are patterned to it. Yes the FBI was told and we should all be telling them anything we can. I do not buy that we are too small and unimportant. Everyone should be weighing in right now. These projects have come to us not the other way around, from people who in my opinion could not have quality data and are not in a position to encumber people's private lives before they acquire the proper information and perform the appropriate disclosures. Furthermore when asked they are not eager to communicate and often become indignant and attempt to be intimidating of people who know the land when they do not. I do not know for sure of course, but there has been so much adversarial encounters from people that were never at odds before, for so long when there did not use to be any of these concerns apparent. Reporting is the first step we all need to be taking.

Thank you for reviewing these concerns. I think you should remove the area from Ramona to Descanso to Julian, from your Ordinance once and for all. I do not favor this ordinance at all. This was specific to an area I know well. It is not an indication that I approve of the rest of it. The view from Crest Summit is stunning. I do not favor ruining it with massive wind. Clearly from the RETI information above that area was flown under the public radar every bit as much and more so. I am not convinced that large wind accomplishes the global warming goals that they claim. At the very least, I think you should table the rest of it for much more review for many of the same concerns.

Thank you for reviewing these serious concerns.

Sincerely,

Cindy Buxton

FAX # 1. 858. 694. 3373

To:

MATTHEW SCHNEIDER

DPLU

5201 RUFFIN RD. STE. B.

S. D. , CA.

92123

From:

JEFFREY McKERNAN

Po Box 1209

BOULEVARD, CA.

91905

Cell 9. 746. 9185

RE: GPA & WIND ORDINANCE'S, BLVD. CORH. PLAN

9 PGS

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GOAL LU-6.6 IS "NOT CONSISTENT" BECAUSE IT DOES NOT INCORPORATE NATURAL FEATURES DUE TO THE TYPE OF PROJECT.

GOAL LU-10.2 IS "NOT CONSISTENT" BECAUSE IT CANNOT RESPECT AND CONSERVE NATURAL FEATURES AND RURAL CHARACTER BY INSTALLING INDUSTRIAL SCALE TURBINES AND MILES OF 138 KV TRANSMISSION LINES.

GOAL LU-10.4 IS "NOT CONSISTENT" BECAUSE IT IS AN INDUSTRIAL SCALE PROJECT THAT WILL SELL ELECTRICITY TO THE COMMERCIAL MARKET. (COMMERCIAL - MADE, DONE OR OPERATING PRIMARILY FOR PROFIT). TURBINES THAT STAND UP TO 500 FT. TALL, WITH BLADES THAT TURN AT OVER 100 M.P.H., GENERATE NOISE AND VIBRATIONS, HAVE FLASHING WHITE AND RED LIGHTS, AND POSE SERIOUS RISKS TO HUMANS AND WILDLIFE ARE NOT "PASSIVE IN NATURE". (PASSIVE - SUBMISSIVE, YIELDING, PATIENT, NOT EXERTING INFLUENCE)

GOAL LU-11.2 IS "NOT CONSISTENT" BECAUSE IT IS NOT COMPATIBLE WITH THE UNIQUE CHARACTER OF THE COMMUNITY. THE PROJECT IS A COMMERCIAL AND INDUSTRIAL DEVELOPMENT.

(INDUSTRY - ANY LARGE SCALE BUSINESS ACTIVITY)
(INDUSTRIAL - CHARACTERIZED BY INDUSTRIES, OF, CON-

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(2)

(CONNECTED WITH, OR RESULTING FROM INDUSTRY)

(INDUSTRIALIZE - TO MAKE INDUSTRIAL - ESTABLISH OR DEVELOP INDUSTRIALISM)

GOAL COS 11.1 IS "NOT CONSISTENT" BECAUSE THE TURBINES AND TRANSMISSION LINES WILL DESTROY SIGNIFICANT SCENIC VISTAS AND NATURAL FEATURES INCLUDING PROMINENT RIDGELINES, DOMINANT LANDFORMS AND SCENIC LANDSCAPES.

GOAL 1 POLICY 3 - IS "NOT CONSISTENT" BECAUSE "INDUSTRIAL ELEMENTS" ARE IDENTIFIED IN THE AREA (WIND TURBINES AND 500KV SUNRISE POWERLINK) AND THE PROJECT WOULD ADD ADDITIONAL INDUSTRIAL ELEMENTS.

POLICY LU 1.1.4 IS "NOT CONSISTENT" BECAUSE SELLING ELECTRICITY IS COMMERCE, THEREFORE THE PROJECT IS COMMERCIAL.

WIND ORD,

2.3-11 BOTH SECTIONS STATE THAT FUTURE

2.4-28 PROJECTS AND LOCATIONS ARE UNKNOWN

AT THIS TIME. THIS IS FAR FROM THE TRUTH. THE COUNTY IS WELL AWARE OF THE CUMULATIVE PROJECTS AS IS DUDEK WHO WROTE THE EIR /EIS FOR TULE, EOD AND ESJ. HOW COULD THESE PROJECTS HAVE BEEN MISSED?

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3

DUDER SHOULD PRESENT A COPY OF THEIR
EIR/EIS TO THE COUNTY.

2.3-17 BECAUSE SECTION 6318 OF THE COUNTY'S
ZONING ORD. REQUIRES COMPLIANCE BY ALL
COMMERCIAL AND INDUSTRIAL USES AS WELL
AS ALL FUTURE PROJECTS, THIS AFFIRMS
THAT TULE WIND IS AN INDUSTRIAL AND
COMMERCIAL PROJECT.

S1-1 "... BUT CONTINUE TO PROHIBIT LARGE WIND
TURBINES IN AREAS WHERE VIEWSHEDS WOULD
BE ADVERSELY IMPACTED." TULE WIND WILL
HAVE CLASS 1 UNMITIGABLE IMPACTS.

S1-5 IF THE "ECONOMIC, SOCIAL, TECHNOLOGICAL
AND OTHER RELEVANT BENEFITS MUST BE
CONSIDERED OVER ADVERSE ENVIRONMENTAL EFFECTS,
THEN THE NEGATIVE IMPACTS TO ECONOMIC, SOCIAL,
TECHNOLOGICAL MUST ALSO BE EXAMINED, SUCH
AS THE LOSS OF PROPERTY VALUES. THE MCCANN
APPRAISAL LLC HAS BEEN SUBMITTED BY THE
BLVD. PLANNING GROUP.

2.4-30 (THELANDER ET AL. 2003) IS OUTDATED
AND GREATER RISKS TO GOLDEN EAGLES HAVE
BEEN IDENTIFIED BY WIND TURBINES.

2.10.1 THIS SECTION STATES THAT MANY VIEWS WOULD BE TRANSFORMED FROM PREDOMINATELY NATURAL OR MIXED NATURAL AND COMMUNITY SETTINGS TO LANDSCAPES WITH STRONG INDUSTRIAL CHARACTERISTICS. THIS CONFIRMS THAT WIND TURBINES ARE INDUSTRIAL BECAUSE THEY ARE TYPICAL AND DISTINCTIVE.

2.10.3 "SOME BIRDS AND BATS COULD BE KILLED THROUGH COLLISIONS WITH THE WIND TURBINES AND POWER LINES, HOWEVER, POPULATIONS OF INDIVIDUAL SPECIES WOULD NOT BE ELIMINATED AND THE IMPACTS TO POPULATIONS WOULD NOT BE IRREVERSIBLE." THIS IS AN ARROGANT AND UNJUST STATEMENT. THE INDUSTRY DOES NOT RELEASE AVIAN MORTALITY STUDIES.

GOLDEN EAGLES, HAWKS, OWLS, BATS, SONGBIRDS, ARE BEING KILLED IN RECORD NUMBERS IN STUDIES DONE OUTSIDE THE INDUSTRY.

IN 2009 THE NORTHERN WHITE AFRICAN RHINOCEROS WAS LISTED AS EXTINCT. IN OCTOBER 2011, IT WAS OFFICIALLY DECLARED EXTINCT IN THE WILD. THE SAN DIEGO ZOO SAFARI PARK HAS 2 OF THE REMAINING 6 LEFT IN THE WORLD.

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M. KERNAN

2.8-12

C. WEIGHTED NOISE WAIVER MUST BE REMOVED BECAUSE IT BECOMES A FREE PASS FOR PROJECTS NOT TO COMPLY.

2.B DOES NOT STATE WHAT SPECIFIC ECONOMIC, SOCIAL OR TECHNOLOGICAL BENEFITS ARE. NEGATIVE ECONOMIC AND SOCIAL EFFECTS MUST ALSO BE IDENTIFIED.

POST CONSTRUCTION SOUND MEASUREMENTS WILL BE REQUIRED. WHEN THE PROJECT IS NOT IN COMPLIANCE, THERE ARE NO RECOMMENDATIONS OR REQUIREMENTS AS TO THE OUTCOME, OR WHAT ACTIONS NEED TO BE TAKEN.

BOULEVARD COMMUNITY PLAN

THE BOULEVARD PLANNING GROUP DID AN OUTSTANDING JOB ON THEIR COMMUNITY PLAN. THE PLANNING GROUP WAS OVERWHELMINGLY ELECTED ON A PLATFORM TO PROTECT AND PRESERVE THE COMMUNITY CHARACTER AND LIFESTYLE ALONG WITH THE RUGGED WILDERNESS.

THE BOULEVARD RESIDENTS SPOKE LOUDLY THROUGH THE ELECTORAL PROCESS THAT THEY DID NOT WANT INDUSTRIAL ENERGY PROJECTS, OR LARGE SCALE COMMERCIAL OR

6

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RESIDENTIAL.

THE PROJECT IS INCONSISTENT WITH,
GOAL LU 1.1

POLICY LU 1.1.1 (RENEWABLE PROJECTS ARE INDUSTRIAL)

" " 1.1.2

" " 1.1.3 (NATURAL FEATURES CANNOT
BE INCORPORATED)

POLICY LU 1.1.4 (THE PROJECT WILL SELL
ELECTRICITY ON THE COMMERCIAL MARKET)

GOAL LU 1.3

POLICY LU 1.3.2

GOAL LU 6.1

POLICY LU 6.1.1

" " 6.1.2

" " 6.1.3

" " 6.1.4

GOAL CM 8.5

POLICY CM 8.5.1

THESE INCONSISTENCIES ARE
SUBSTANTIAL AND SHOULD NOT BE AMENDED.
THE GENERAL PLAN AND COMMUNITY PLAN
WERE ADOPTED BY THE BOARD OF SUPERVISORS.

THE COUNTY STAFF NEEDS TO
LEAVE THE LANGUAGE IN THE
DOUGLASS COMMUNITY PLAN AS IT WAS
WRITTEN AND ADOPTED.

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PG 16 Policy LU 1.1.1 - RENEWABLE ENERGY
PROJECTS ARE INDUSTRIAL.

Policy LU 1.1.2 "REQUIRE" MUST BE LEFT
IN FOR PROTECTION. ENCOURAGING WILL NOT
WORK AND MEANS PROJECTS WOULD NOT HAVE
TO COMPLY. (WILLY NILLY?)

Policy LU 1.1.3 "REQUIRE" MUST BE LEFT IN
FOR PROTECTION OF THESE VALUABLE
RESOURCES.

PG. 18 Policy 1.2.1 "INDUSTRIAL" MUST BE LEFT
IN.

Policy LU 1.2.2 RENEWABLE PROJECTS REQUIRE
REGIONAL INFRASTRUCTURE.

PG 23 ISSUE LU-6.1 - LARGE SCALE ENERGY
PROJECTS ARE INDUSTRIAL. IF THEY
CAN IMPACT (NEGATIVELY) COMMUNITY CHARACTER, AND
OVERALL QUALITY OF - RURAL LIFESTYLE, THEN
PROPERTY VALUES WILL BE IMPACTED.

Policy LU 6.1.1 - LARGE SCALE ENERGY
GENERATION PROJECTS ARE INDUSTRIAL AND
COMMERCIAL.

PG 24 Policy LU 6.1.2 "REQUIRE" : MUST
BE LEFT IN. ENCOURAGE LEAVES TOO MUCH
ROOM FOR INTERPRETATION.

Policy LU 6.1.4 - MUST REMAIN.
ADVERSE HEALTH IMPACTS MUST REMAIN. THEY ARE
IDENTIFIED IN TOLE EIR/EIS AND THE COUNTIES

8
McKERNAN

OWN WIND ORDINANCES.

ADVERSE PROPERTY VALUES MUST REMAIN
BECAUSE AS VIEWSHED AND QUALITY OF LIFE,
AS WELL AS NOISE LEVELS ARE NEGATIVELY
IMPACTING RESIDENTS, SO WILL PROPERTY VALUES
BE IMPACTED.

PG 32 POLICY 8.6.2 MUST REMAIN TO PROTECT
HIGH RISK FIRE AREAS AND GROUNDWATER
DEPENDANT COMMUNITIES.

IMPLEMENTATION PROG. CM 8.6.1 MUST REMAIN
TO INFORM AND PROTECT RESIDENTS

PG 38 4.1 MUST REMAIN. THESE ARE
TRULY VALID CONCERNS

PG 41 5.1 - INDUSTRIAL MUST REMAIN
ALONG WITH HEALTH IMPACTS, LOSS OF PROPERTY
VALUES, AND QUALITY OF LIFE.

5.2 ISSUE N 2.1 - CONTINUOUS NOISE
LEVELS, THAT ARE "AND CREATE A NUISANCE
DO MORE THAN "DISRUPT THE QUIET ENJOYMENT
OF ONE'S PROPERTY". IN SECT. 2.8 NOISE
IS IDENTIFIED AS A HEALTH ISSUE. CONSTANT
NOISE (MOST PROJECTS WILL BE OPERATING FOR
30 YEARS) WILL HAVE SIGNIFICANT NEGATIVE PROPERTY
AND HEALTH IMPACTS.

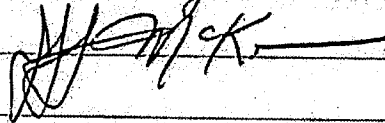
THESE ARE ALL LEGITIMATE
CONCERNS THAT THE COUNTY HAS OBVIOUSLY
DECIDED AREN'T NECESSARY OR ARE IN THE

9

McKERNAN

WAY OF THE WIND INDUSTRY WHO
APPARENTLY HAVE HAD A VERY HEAVY HAND
IN THE WIND ORDINANCE AND THE DIS-
MANTLING OF THE BOULEVARD COMMUNITY
PLAN. I GUESS THIS IS HOW YOU GET
HIRED BY THE PRIVATE SECTOR WIND AND
SOLAR INDUSTRY.

Thank You,
Sincerely,



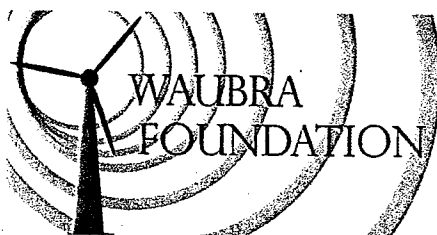
JEFFREY MCKERNAN

PO BOX 1209

BOULEVARD, CA.

91905

619.766.9185



LATE SUBMITTAL

MAY 11 2012

Received by the
San Diego County
Planning Commission

11th May, 2012

WIND TURBINE ACOUSTIC POLLUTION ASSESSMENT REQUIREMENTS

On behalf of the many people around the world, suffering acute and chronic health damage from living near wind turbines, the Waubra Foundation demands that relevant authorities initiate:

- *full frequency spectrum acoustic monitoring inside and outside the homes and workplaces of people claiming health problems caused by the proximity of operating wind turbines;*
- *the monitoring must be conducted for sufficient time, under the weather and wind conditions indicated by victims as being contributive to their symptoms;*
- *measurements must specifically include, infrasound and low frequency noise, (dBZ or dBLin, dBA, dBC, & dBG).*

The noise monitoring must be performed by accredited acousticians demonstrably independent of the wind industry, approved by the sufferers, and in a manner that will avoid any deliberate manipulation of turbine operation to reduce the acoustic emissions during testing. The results (including all the raw data and associated sound files) must be made available to all parties.

The Rationale for These Demands

- Most health practitioners are well aware of the links between chronic severe sleep deprivation¹ chronic stress² and poor physical and mental health. This is exactly what residents living near wind turbines are experiencing,³ together with other specific symptoms directly correlating with acute exposure to this sound energy.^{4,5,6,7}
- Knowledge of the damage to health from exposure to infrasound⁸ and low frequency noise⁹ (ILFN) has been known for many years. Despite this, little is known about the current exposure levels of residents to ILFN emissions from wind turbines inside their homes.
- The link between chronic exposure to low frequency noise and chronic physiological stress, even when asleep, was clearly highlighted by Professor Leventhall et al in 2003.¹⁰
- Most medical practitioners have been unaware of the problems associated with exposure to ILFN. This ignorance has not been helped by acousticians and others calling such problems "annoyance" without accurate clinical diagnoses.¹¹
- These symptoms have been reported to occur specifically with exposure to operating wind turbines by medical practitioners since 2003.^{12,13,14,15,16,17} Symptoms have been reported by acousticians, health practitioners and residents from countries including Denmark, Sweden, Germany, United Kingdom, France, United States, Canada, New Zealand and Australia.
- Symptoms have been reported historically up to 4 km from the nearest wind turbine, and more recently characteristic symptom patterns have been reported at distances up 10km away from the nearest wind turbine¹⁸. This is described especially with larger wind turbines (eg 3MW), and on occasions even further away, where turbines are sited at altitude¹⁹ or near expanses of water.
- These health problems consistently worsen over time, until the exposure ceases. Families are being advised by their treating doctors to leave their homes in order to regain their health. Many have nowhere else to go, and cannot sell their homes, so they become homeless "wind farm refugees". Others remain trapped, unable to move²⁰.

- Professors Moller and Pedersen, from the University of Aalborg in Denmark, have confirmed that larger more powerful wind turbines emit more low frequency sound waves as a proportion of their sound emissions²¹. These emissions are known to easily penetrate through the walls, roofs, and windows of homes and workplaces, due to the lower transmission loss of low frequencies.
- Recent acoustic survey work in the USA (Falmouth)²² and Australia (NSW)²³ has confirmed that low frequency noise and pulsatile infrasound emitted by wind turbines have been measured inside the homes and workplaces of sick people, and occur when they are experiencing the symptoms of Wind Turbine Syndrome.
- Currently governments around the world do not require measurement of the full sound and vibration spectrum, do not require measurement **inside** homes and workplaces, do not require evaluation of sleep or other disturbances, but instead limit almost all assessment to audible noise (dBA) only, **outside** homes and workplaces.

Summary

The plight of people made ill by wind turbine acoustic pollution has been universally ignored by their respective governments.

The current noise assessment practices and standards are incompetent and unacceptable, and must be changed to include full spectrum acoustic monitoring inside homes and workplaces as a matter of urgency.

References

1. **Capuccio F et al**, "Sleep Duration predicts cardiovascular outcomes: a systemic review and meta-analysis of prospective studies" European Heart Journal, (2011) 32, 1484-1492
2. **McEwen, Bruce** "Protective and Damaging Effects of Stress Mediators" NEJM 1998, 338 171-179
3. **Shepherd, Daniel et al** "Evaluating the impact of wind turbine noise on health-related quality of life" Noise & Health, September-October 2011, 13:54,333-9 <http://www.wind-watch.org/documents/evaluating-the-impact-of-wind-turbine-noise-on-health-related-quality-of-life/>
4. **Pierpont, Dr Nina** "Wind Turbine Syndrome, A report on a Natural Experiment" Published by K Selected Books, Santa Fe NM 2009 www.windturbinesyndrome.com see also <http://www.wind-watch.org/documents/wind-turbine-syndrome-excerpts-from-the-executive-summary/>
5. **McMurtry, Professor Robert** "Toward a Case Definition of Adverse Health Effects in the Environs of Industrial Wind Turbines: Facilitating a Clinical Diagnosis" Bulletin of Science Technology and Society 2011 31:316 <http://bst.sagepub.com/content/31/4/316>
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8. **NIEHS** (National Institute of Environmental Health Sciences) November 2001, "Infrasound Brief Review of Toxicological Literature"
9. **Leventhall, Benton & Pelmear**, May 2003 op cit
10. **Leventhall, Benton & Pelmear**, May 2003 op cit Section 10

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13. **Iser, Dr David** personal communication
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<http://bst.sagepub.com/content/31/4/316>
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20. <http://www.wind-watch.org/news/2012/03/09/letter-to-australian-prime-minister-from-dr-sarah-laurie/>
21. **Moller & Pedersen** "Low Frequency Noise from Large Turbines" J Acoustical Society America 2011 129: 3727 – 3744 <http://www.wind-watch.org/documents/low-frequency-noise-from-large-wind-turbines-2/>
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<http://www.wind-watch.org/documents/review-of-nsw-draft-wind-farm-guidelines/>

Schneider, Matthew

From: Donna Tisdale [tisdale.donna@gmail.com]
Sent: Friday, April 06, 2012 4:19 PM
To: Schneider, Matthew; Slovic, Mark
Subject: Wind Energy Ordinance & Plan Amend
Attachments: Wind Ener Ord DEIR BAD_POC revised final comments 1-24-12.pdf; EXPLICIT CAUTIONARY NOTICE.pdf; Health Warning - EPAW_NAPAW_11 dec 2011.pdf; VAD-press-release-070531.pdf; Cumulative Renewable Projects as of 1-23-12.pdf

To: Matthew Schneider and Mark Slovik,

RE: POD 10-007 Wind Energy Ordinance & Plan Amendment

My apologies, again, for not getting the Boulevard Planning Group's finalized comment letter submitted in a timely manner.

In the intermim, I am providing the following information, and attachments, for the record, and hope to provide the finalized comment letter prior to the April 13 Planning Commission hearing.

I am also requesting some extra time to make a power point presentation at the April 13 hearing.

Thank you
Donna Tisdale, Chair
Boulevard Planning Group
619-766-4170

At our regular meeting held on December 1, 2011, the following actions were taken to oppose these projects however, our minutes have not yet been approved:

Item 5C: Tule Wind Major Use Permit 3300 09-019, General Plan Amendment 3800 11-001, Log NO. 09-021-002:

M/S Hall/ Lawrence – Approve Chair to revise previous comments opposing Tule Wind MUP and GPA and to include additional comments, concerns, and items discussed. Oppose all revisions to our community plan. Go on record that turbines are not a civic use, they are commercial industrial energy projects. Specify definition small vs. large turbines. Passes 6-0-0

Item 5 E: County Revised Wind Energy Ordinance and Plan Amendment Draft EIR:

M/S Lawrence/McKernan: Approve draft resolution content (in opposition) with recommended changes; Allow Chair to add additional amendments, supplements, and member comments; incorporate by reference the comment letter submitted by Backcountry Against Dumps and The Protect Our Communities Foundation (on Wind Energy Ordinance & Plan Amend): Approved 6-0-0

- 1) WE STRONGLY REQUEST A COUNTY-WIDE MORATORIUM ON LARGE-SCALE INDUSTRIAL WIND TURBINE PROJECTS AND THE INITIATION OF LEGITIMATE INDEPENDENT SCIENCE-BASED MEDICAL EPIDEMIOLOGICAL FIELD AND LABORATORY AND RESEARCH TO DETERMINE WHAT, IF ANY, SETBACKS[1], [2] FROM OPERATING LARGE WIND TURBINE PROJECTS ARE ADEQUATE TO PROTECT BASIC CIVIC AND HUMAN RIGHTS, PUBLIC HEALTH AND SAFETY[3], [4], and other critical resources from direct, indirect[5], and cumulative project-related emissions[6] / impacts / effects , including ELF, EMF, Radio Frequency radiation [7], [8], [9], [10], microwave radiation[11], [12], and the need for backup / load balancing

generation[13] that is usually gas-fired / peaker power plants[14] , [15], [16]and related increased emissions [17], increased risk of fire[18] and impediment to fire fighting is also a major concern.

2) WE STRONGLY OPPOSE THE PROPOSED DRAFT EIR FOR THE WIND ENERGY ORDINANCE; THE GENERAL PLAN AMENDEMENT ; AND THE REDUCED TURBINE PROJECT ALTERNATIVES[19] BASED ON, BUT NOT LIMITED TO, THE FOLLOWING REASONS:

- Proposed changes represent at least 24 significant adverse impacts that reportedly cannot be mitigated below a level of significance.[20]
- Potential transformation of over 800,000 acres [21] of San Diego County's quiet rural communities, sensitive habitats[22], [23]and iconic uncluttered open landscapes into industrial energy export sacrifice zones meant to serve distant urban/ suburban areas[24], [25], [26],[27],[28].
- Lack of empirical unbiased data to support the proclaimed safety, reliability, lack of emissions, GHG benefits, cost/ benefit analysis , economic viability of large-scale commercial industrial wind energy.
- Lack of legitimate cumulative impact projects list, and/or selection of those that are relevant to the project proposal and disproportionate adverse impacts to targeted areas that include the Boulevard Planning Area
- (AT PAGE 15) Amending Section 7359 FINDINGS REQUIRED FOR PARTICULAR USE PERMITS for Large Wind Turbines removing protections for impacted communities represents an unconscionable and unsupportable double standard between communities and resources located within known wind resource areas and those that are not.

3) WE STRONGLY SUPPORT THE NO PROJECT ALTERNATIVE AS BEING THE MOST PROTECTIVE OF THE FOLLOWING:

- The Recently approved General Plan Update [29], Community Plans & Rural communities [30]
- The Boulevard Community Plan[31]: Boulevard is the most highly and disproportionately impacted rural community, followed by Jacumba, as demonstrated by the cumulative project maps that are already outdated.[32]. The Boulevard Community Plan is singled out for amendments to remove long fought protections for people, property, views, and other valuable resources, certified by the Board of Supervisors' August 2011 General Plan Update approval, and to allow industrial wind turbine projects . However, the Borrego Community Plan will be amended to disallow industrial wind turbines in order protect their viewsheds. WE agree that Borrego viewsheds should be protected, but why are Borrego viewsheds more valuable than Boulevard's?
- Rural residents and [33] ,[34], socioeconomics[35] ,[36],[37] ,[38], in and around Alpine, Boulevard, Borrego Springs, Campo, Descanso, Jacumba, Julian, Pine Valley, Potrero, Ramona, Santa Ysabel, Warner Springs, Ocotillo Wells, and any other impacted rural community, many of which qualify as low-income communities located in High Fire Severity Zones[39].
- Eco regions [40] , habitats, wildlife migration corridors, and related at-risk resources [41], [42] ,[43]
- Military and Homeland Security Training & Operations, Routes of Travel , and emergency services aviation and communications[44],[45] .

4) WE STRONGLY REQUEST THAT ANY WIND TURBINE PROJECTS THAT MAY OVERCOME INTENSE OPPOSITION AND THE EXPECTED LITIGATION, AND SUCCEED IN MOVING FORWARD, BE REQUIRED TO PROVIDE PROPERTY VALUE GUARANTEE (PVG) AGREEMENTS as recommended by professional real estate appraisers [46] who are not beholden to the wind industry.[47]. PVG Agreements are usually opposed by the wind industry , such as Tule Wind's developer, Iberdrola[48]- and their supporters, with willful blindness and false claims that there are no adverse impacts on property values.

5) WE STRONGLY SUPPORT BETTER, LESS INVASIVE, LESS DESTRUCTIVE, LESS LAND INTENSIVE, LESS EXPENSIVE ALTERNATIVE ENERGY OPTIONS, INCLUDING MUCH SMALLER POINT OF USE VERTICAL AXIS WIND TURBINES[49], SOLAR PV, PLUG IN SOLAR CPV UNITS, FUEL CELLS[50], GEOTHERMAL HEAT / COOLING PUMPS[51]--ALL FOLLOWING ENERGY EFFICIENCY AND CONSERVATION MEASURES

[1] Explicit Cautionary Notice To Those Responsible for Wind Turbine Siting Decisions:

<http://waubrafoundation.com.au/Y2NpZD0xJmNhaWQ9MTMmYWlkPSZjcmM9MTQ0OTg1MjMyOA%3D%3D>

[2] Wind turbines and public safety: Setbacks matter: <http://www.windaction.org/faqs/33327>

[3] A Summary of new Evidence: Adverse Health Effects and industrial wind turbines: <http://www.epaw.org/documents.php?lang=en&article=ns25>

[4] Bill of Rights for remedying objectionable flows of electrical current:

<http://www.electricalpollution.com/documents/AB529.pdf>

[5] Radio interview with experts related adverse economic, safety, and other related costs: <http://www.wind-watch.org/documents/pat-miller-on-wind-turbines/>

[6] EMF/ RFR/ transient dirty electricity ground currents: <http://www.electricalpollution.com/>

[7] American Academy of Environmental Medicine letter to PUC Jan 19-12:

<http://www.magdahavas.com/wordpress/wp-content/uploads/2012/01/AAEM-Resolution.pdf>

[8] <http://www.magdahavas.com/what-do-dancing-cows-and-zapped-dogs-have-in-common/>

[9] Examples of Effects Found in Research, and Corresponding Epidemiological Findings:

<http://emfwise.com/science.php>

[10] Biological Effects from EMF: http://www.magdahavas.com/wordpress/wp-content/uploads/2010/11/Blake_Levit-Henry_Lai.pdf

[11] 18 Peer-Reviewed resolutions/ appeals: Biological and health effects related to EMF/ RFR:

<http://www.magdahavas.com/2011/06/12/international-experts'-perspective-on-the-health-effects-of-electromagnetic-fields-emf-and-electromagnetic-radiation-emr/>

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Humans <http://monographs.iarc.fr/ENG/Meetings/vol102-participants.pdf>

[13] [ftp://ftp.cpuc.ca.gov/ElectricGenerationPerf/Map of Fossil Fuel Plants 5 12 11.pdf](ftp://ftp.cpuc.ca.gov/ElectricGenerationPerf/Map%20of%20Fossil%20Fuel%20Plants%205%2012%2011.pdf)

[14] Wind and Gas Back-up or Back-out?: <http://www.wind-watch.org/documents/wind-and-gas-back-up-or-back-out-that-is-the-question/>

[15] 300 MW Pio Pico Energy / SDGE has PPA:

[http://www.energy.ca.gov/sitingcases/piopico/documents/applicant/2012-01-](http://www.energy.ca.gov/sitingcases/piopico/documents/applicant/2012-01-24)

24 Applicant Letter to Eric Solorio Re SDAPC Notice TN-63442.pdf

[16] SDGE 100MW Quail Brush Peaker plant to support renewables:

<http://www.energy.ca.gov/sitingcases/quailbrush/index.html>

[17] <http://www.wind-watch.org/documents/windmills-increase-fossil-fuel-consumption-and-co2-emissions/>

[18] Altona Wind Turbine Catches Fire: <http://www.wptz.com/news/30324377/detail.html#ixzz1kovDGJ3p>

[19] Wind Energy Ord & GP Amendment DEIR: POD 10007: <http://www.sdcounty.ca.gov/dplu/ceqa/POD10007.html>

[20] POD10007: S.3: Page S.1-4

[21] POD 10007: S

[22] <http://www.cpuc.ca.gov/environment/info/dudek/ecosub/Tule%20ABPP%20signed%20Memo%2010-4-11.pdf>

[23] The Costs of Chronic Noise Exposure for Terrestrial Organisms http://works.bepress.com/jesse_barber/1/

[24] <http://sdge.com/sites/default/files/documents/ECOSubstationProjectMap.pdf>

[25] ECO Substation designed to expand to at least 4800 MW (5-500kV plus) see page 8 of linked SDG&E Application A09-08-003: http://www.cpuc.ca.gov/environment/info/dudek/ECOSUB/SDG&E%20ECO%20Application_A0908003.pdf

[26] Invenergy/SDGE/Campo Band: Shulluk Wind: <http://www.gpo.gov/fdsys/pkg/FR-2011-05-20/html/2011-12416.htm>

[27] Enel Green Power; Jewel Valley Wind: <http://www.jewelvalleyproject.com/overview.asp>

[28] ECO Substation, Tule Wind, ESJ Gen-Tie EIR/EIS: <http://www.cpuc.ca.gov/environment/info/dudek/ecosub/ecosub.htm>

[29] <http://www.sandiegocountynews.com/2011/08/04/county-supervisors-approve-general-plan-update/>

- [30] <http://www.wind-watch.org/news/2011/02/06/the-case-against-industrial-wind-turbines/>
- [31] Boulevard Community Plan:
http://www.sdcounty.ca.gov/dplu/gpupdate/docs/BOS_Aug2011/C.2_10a_BOULEVARD_08.03.11.pdf
- [32] Attached Cumulative Projects Overview map provided by Patrick Brown in Jan 2012
- [33] E-coustic solutions comments and extensive references on adverse effects/impacts related to wind turbines: <ftp://ftp.co.imperial.ca.us/icpds/eir/ocotillo-express/combined-04-public-02-p170-through-p269-sm.pdf>
- [34] <http://www.thisisdevon.co.uk/Farmer-given-anti-depressants-overcome-wind-farm/story-15030725-detail/story.html>
- [35] <http://www.ofa.on.ca/uploads/userfiles/files/ofa%20position%20statement%20on%20industrial%20wind%20turbines.pdf>
- [36] Effects of electrical shocks on cattle: <https://www.msu.edu/user/hillman/elecshok.htm>
- [37] Wind Farm Kills Taiwanese Goats: <http://news.bbc.co.uk/2/hi/8060969.stm>
- [38] Wind farm shut down after death of young bullock in field:
<http://www.pressandjournal.co.uk/Article.aspx/2357094>
- [39] http://frap.cdf.ca.gov/webdata/maps/san_diego/fhszl_map.37.pdf;
http://www.fire.ca.gov/fire_prevention/fhsz_maps/fhsz_maps_sandiego.php
- [40] http://www.sdcounty.ca.gov/dplu/mscp/docs/east_mscp_ecoregions_8x11.pdf
- [41] http://www.sdcounty.ca.gov/dplu/mscp/ec_species.html
- [42] http://www.sdcounty.ca.gov/dplu/mscp/ec_biology.html
- [43] http://www.sdcounty.ca.gov/dplu/mscp/docs/ECMSCP/East_County_Focal_Species_List.pdf
- [44] http://www.savewesternny.org/pdf/windfarms_effects_public_radio_systems.pdf
- [45] <http://www.wind-watch.org/news/2012/01/26/wind-turbine-would-interfere-with-raf-radar/>
- [46] <http://www.wind-watch.org/news/2012/03/30/property-value-losses-near-wind-turbines-greater-than-previously-thought-appraisers-say/>
- [47] Zoning Evaluation and Property Values: <http://www.wind-watch.org/documents/zoning-evaluation-and-property-value-impact-study/>
- [48] Iberdrola Threatens to Leave: <http://www.ogd.com/article/20101208/OGD01/312089904/-1/ogd01>
- [49] <http://dabiri.caltech.edu/research/wind-energy.html>; <http://dabiri.caltech.edu/research/wind-energy.html>
- [50] <http://www.clearedgepower.com/>
- [51] <http://www.popularmechanics.com/science/energy/hydropower-geothermal/4331401>

Schneider, Matthew

From: Britta Lee Shain [howlingcoyote@teepeemusic.com]
Sent: Thursday, October 04, 2012 4:05 PM
To: Schneider, Matthew
Subject: Wind Energy Ordinance Amendment

Hey, Matthew: It probably looks better like this...If you could please forward this revised letter to the proper authorities, it would be greatly appreciated...

October 4th, 2012

Re: WIND ENERGY ORDINANCE AMENDMENT

Attention: San Diego County Board of Supervisors

To whom it may concern:

We are, what I can best characterize as, the "victims" of wind turbine abuse. We live in an extremely quiet area of the Anza-Borrego desert where there are only a handful of houses, many unoccupied for most of the year. We began our complaint process in February of 2008 when we first learned that our next door neighbor was about to erect a 50' tower approximately 160 feet from our property line, directly west of our home. At the time, despite our protest, the county approved a permit for a Skystream 3.7 Wind Turbine located at 35481 Great Southern Overland, Julian, Ca 92036. Here is some of what we have learned in the 4 years hence:

1. Living next door to a wind turbine has an extremely negative impact on our quality of life. We live in an area that is windy enough to spin the turbine approximately 4 - 5 out of every 7 days. We can no longer enjoy our meals outdoors, garden peacefully, nor sleep with our windows open, even on the hottest nights of the year except on rare occasions.
2. The cut-in speed of the Skystream 3.7 is said to be 8mph, but the turbine is capable of spinning when there is barely a breeze. This means that the smallest welcomed breath of moving air in this remote desert location can be, and often is, infected with the noise pollution of the turbine.
3. By the company brochure's own admission, the turbine operates in the 50 to 60 decibel range. It is our understanding that the decibel limits for our S-92 zoning (at least during the periods that we have previously tested)are 45 at night and 50 during the day, so we have been continually baffled as to how this permit got approved.
4. The turbine can sound like a small plane in the distance, a helicopter hovering, or the high pitched whine of a passing motorcycle. It can also sound like rattling chains. The difference is that these other sounds would be fleeting whereas the turbine can and has run at times consistently for days or nights on end.
5. Despite what it says in the brochure, the wind turbine noise is almost ALWAYS audible to the ear above the background. When in operation, the turbine's sound is significant enough to infect every corner of our 1 3/4 acre property including the interior spaces and can also be heard in the adjacent Anza-Borrego state park. Unlike the city, there are no sounds of light industry, car alarms or a constant buzz of traffic to mask the Turbine's sound.
6. Additionally, since the turbine was placed due west of our home, every late afternoon and early evening, a STROBE or rapidly flickering light is cast on our land and, at times, into our house. This can be extremely disconcerting and it is my understanding that it can have serious health consequences, but my enquiries with the county have yielded simply that "it's unfortunate."

We have recently brought up all of these matters to the County Commissioners to no avail. We even made a video of the strobing effect on our house, which is quite disturbing, but because we are the only complaint the County has received so far, our issue was not addressed. In addition, it has come to my attention that the Decibel measurement that is used to assess a noise complaint is not the appropriate measurement for the kind of noise made by this small wind turbine as it does not take into

account the Frequency of the noise which would be classified a nuisance by any other objective account. Since Frequency is taken into consideration on Large Wind Turbines, perhaps it should be taken into account on Personal Wind Turbines as well. And finally, there were 3 similar wind turbines manufactured by the same company and installed in the Deep Well subdivision of Borrego Springs during the same time period as the one next door to us. They have all been taken down!

Below is the the letter I forwarded to the Commissioners most recently which further documents our complaint.

I would greatly appreciate your help in this matter and certainly hope that you make note of these pitfalls of Small Wind Turbines in your determinations, to at the very least, keep this from happening to anyone else. I suffer from stage 3 Lyme Disease and it was always my goal in living in this remote part of the desert to reside in a peaceful, healing environment.

Thanks in advance,

Britta Lee Shain
(Marcel V. Shain)
35493 Gr S Overland
Julian, Ca 92036

c 310 613 9706

WIND TURBINE ORDINANCE CORRESPONDENCE - SHADOW FLICKER

May 17, 2012

Re: Setbacks for Personal Wind Turbines in San Diego County

Dear Commissioners...

Thank you so much for offering the public an opportunity to be heard. I realize that the 50 foot tower 160 feet from our property line, and due West of us, is a mere "stick" in comparison with the larger Wind Farms, but, as pointed out in my husband's and my presentations at the hearing and wind workshop, the personal wind turbines are not without their problems: Namely...Noise and Shadow Flicker.

While we are actively engaged in a noise violation complaint, I am very concerned at the notion that because my husband and I are the only complainants, thus far, in regard to Shadow Flicker that somehow there is no need for including it in the revisions to the Wind Ordinance. The fact that it has happened once, as evidenced by our video, is proof positive that it could happen again.

Since the wind workshop, I have spent a couple of hours researching the phenomenon of Shadow Flicker as it pertains to Small Personal Wind Turbines in general and the Skystream 3.7 (the offending unit in our case) in particular. It is apparent from my reading that in other jurisdictions in the United States and in other places around the world, the flicker effect is definitely being taken into consideration in writing the laws. Here is some of what I found in the available online literature. Some of this is text quoted directly from the various sources.

Complaints of Shadow Flicker from Small Personal Wind Turbines (Skystream 3.7), have been filed in San Francisco, Arkansas, Illinois, Australia and other places around the world.

Shadow flicker results from the position of the sun in relation to the blades of the wind turbine as they rotate. Under certain combinations of geographical position and time of day the sun may pass behind the wind turbine causing a flickering effect. This is particularly an issue for turbines located to the *east or west* of a dwelling. Given the height of the wind turbine, shadow flicker may be experienced by the dwellings to the west of the site in the morning (sunrise) or to the east of the site in the evening.

San Francisco:

Installation of the same model windmill in a Forest Hill Extension home (167 Hernandez Ave.) 0.57 miles from the currently proposed site and with similar topography to the proposed site *resulted in complaints from neighbors about noise and light*

(strobe-like) effects, and produced far less power than expected, so that the owner of that property now wants to remove the windmill. Product literature for the proposed Skystream 3.7 windmill stipulate that for maximal efficiency clearance of at least 275 ft horizontally and 20 ft vertically from the nearest structure is required, making it likely the proposed project will yield much less than half of the optimal energy.

Illionois:

When the sun shines through the rotating turbine blades, it creates a periodic shadow called 'flicker'. It has a strobe effect that can be noticed by humans and wildlife and on sunny days, can be of high intensity. The industry has met this condition by following local ordinances that define the minimum distance a turbine should be from any residential structure (typically 500 feet for land owner, 1000 feet for adjacent property owners). However, the angle of the sun in the sky can still impact a site and if it happens, must be resolved after-the-fact either via local ordinance or mitigating actions. Wildlife tends to avoid residential areas and therefore may be found closer to the turbine location, so flicker and the amount of time flicker occurs at a particular spot may or may not be an issue. Species of birds and mammals which require open grasslands may be most affected by flicker since it indicates the presence of a predator (IDNR Study 2007).

Regulating Backyard Wind Turbines 303

With certain installations and light angles there can be a shadow flicker which is visually disturbing. Wind turbines have shadows; in morning and late afternoon hours it is not unusual to have shadows cast across a window or yard.⁹⁴ When the blades are turning, there is a flicker to the shadow which can be quite disturbing.⁹⁵ It does not happen often, or for long periods, but for nearby properties it can be an annoyance.⁹⁶

The potential for flicker can be evaluated. Local standards should be established for the number of hours per year and the number of minutes per day when flicker can affect neighboring properties. There are no generally acceptable standards. One source speculates that the radius for impact analysis should be about 1,750 feet around the tower and that flicker should not exceed thirty hours per year and a maximum of thirty minutes per day.⁹⁷ The potential for flicker is very low once you get beyond ten rotor diameters from the turbine, so it is unlikely to be a serious problem with the small rotors in typical homeowner installations.⁹⁸

There was a study conducted at MIT that says 10 times the diameter of the turbine blades should be enough of a set back to avoid Shadow Flicker. You can bet I will be contacting them when I have more time. Another study says 12 times, but even that would not have been enough to protect us. There are also questions raised as to the allowable number of hours that should be approved for this nuisance to affect a neighboring property. I can tell you that Shadow Flicker affects our land for at least 4 months of the year, so that if you are gardening, birding, relaxing, or attempting to eat outdoors or even if you are looking out your windows, you had better escape to a part of the property that is not flickering. It affects the interior of the house directly for at least 1 month in spring and one month in fall every early evening.

A while back when I checked the lighting ordinance for San Diego County, it said something to the effect that it was against the law for a neighbor to have a light on, or in, his house that casts light across his neighbor's property line. I find it shocking that such an affront to anyone's sensibility as Shadow Flicker has been allowed to persist, let alone that this affront would be perpetuated into the future. (I wrote to Brian Baca on April 28, 2009 about the Shadow Flicker issue and was told that the land owner had complied with the permit. When I followed up with a phone call, Mr. Baca's staff said that the circumstance of the Shadow Flicker was "unfortunate".)

Finally, as I'm sure you are aware, apart from the sheer nuisance, there are known health risks associated with Shadow Flicker. I find it curious that numerous agencies have expressed concern about the effect of Shadow Flicker on wildlife, but they don't seem to express the same concern for we, mere human beings.

Point of interest: Shortly after the Skystream 3.7 was installed next door to us, 3 personal wind turbines were installed in Borrego Springs in a neighborhood called Deep Well. When I went there, Tuesday, they were all gone!

Exact sources are available upon request. Please keep this travesty from perpetuating. Thank you for your consideration.

Britta Lee Shain
Marcel Shain

35493 Gr S Overland
Julian, CA 92036

310 613 9706

Schneider, Matthew

From: George M Coladonato [agargentocom@yahoo.com]
Sent: Thursday, October 04, 2012 10:46 AM
To: Jones, Cheryl
Cc: Schneider, Matthew; Farace, Joseph
Subject: Wind Ordinance

**GEORGE M COLADONATO
9640 B MISSION GORGE RD #352
SANTEE, CA 92071**

October 4, 2012

VIA E-MAIL & HAND DELIVERY

San Diego County Planning Commissioners

Attn: Cheryl Jones

5201 Ruffin Road, Suite B

San Diego, CA 92123

Re: **Wind Energy Ordinance**

Dear, Ms. Jones

I oppose the Wind Energy Ordinance in its current form and request that the commission instruct staff to modify the ordinance to add language that would permit small land owners to generate **ALL** the energy they need for their projects on parity with solar. The existing ordinance limits Small wind to 50 kW while there is no limit on solar. The technology on small wind turbines is rapidly changing and in our location wind energy generation is superior to solar in; land and water requirements, cost and efficiency.

As a country we need to become energy independent and permitting us to develop ALL our energy needs, with excess going onto the grid, we will gladly do our part.

Thank You and Be Well,

George M Coladonato
619 865 5670

From: Donna Tisdale [tisdale.donna@gmail.com]
Sent: Thursday, July 19, 2012 9:56 PM
To: Jones, Cheryl; Schneider, Matthew
Subject: additional Wind Energy Ord comments
Attachments: Adverse health effects of EMF exposure 5-2010.pdf

Hello Cheryl and Matthew,

I wanted to make sure that Jim Simpson's comments, below, were included in the record for the Wind Energy Ordinance.

I would also like to add the attached letter, dated May 2010 into the record: .

Adverse health effects of exposure to power frequency electric and magnetic fields (EMFs)

The author, Dr Dennis Henshaw (University of Bristol HH Physics Laboratory) has spent over 35 years studying the effects of radiation and EMF exposure

One quote from Dr Henshaw's letter:

"The available evidence on adverse health effects of MF exposure speaks for itself. No longer can we talk of differing opinions of whether or not there are such adverse health effects: the question is not about what people think, rather it is about what the evidence says."

Thank you
Donna Tisdale
619-766-4170

On Thu, Jul 19, 2012 at 8:33 PM, Jim Simpson <jim91905@yahoo.com> wrote:
For Your Review

Living in Boulevard for the past few years, the last thing I would have thought would come into the back country would be industry. Our community would be adversely impacted for many years. As the development of new green power is in its infancy I can't support this project. Until the effects of wind turbines are truly understood this proposal shouldn't move forward. With limited resources in a location that's sparsely populated it's difficult to have a voice. I support the Boulevard Planning groups proposal.

Thank You
Jim Simpson
619-954-4777

From: Jim Simpson [jim91905@yahoo.com]
Sent: Thursday, July 19, 2012 8:33 PM
To: Jones, Cheryl; Schneider, Matthew; Jacob, Dianne; Donna Tisdale
Subject: Wind Farm Proposal

For Your Review

Living in Boulevard for the past few years, the last thing I would have thought would come into the back country would be industry. Our community would be adversely impacted for many years. As the development of new green power is in it's infancy I can't support this project. Until the effects of wind turbines are truly understood this proposal shouldn't move forward. With limited resources in a location that's sparsely populated it's difficult to have a voice. I support the Boulevard Planning groups proposal.

Thank You
Jim Simpson
619-954-4777



University of
BRISTOL

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Denis L Henshaw
Professor of Physics

TO WHOM IT MAY CONCERN

May 2010

Dear Sir

Adverse health effects of exposure to power frequency electric and magnetic fields (EMFs)

I am writing in response to enquiries I have received on the above issue.

It is indeed unfortunate that the question of health effects of exposure to EMFs well below current exposure guidelines has not received the highest level of scientific or public health attention that it deserves. The evidence of adverse health effects from EMFs associated with the electricity supply, in particular magnetic field (MF) exposures around or below 1 microtesla (μT), is huge and it is quite clear across a range of outcomes. We have long passed the stage where application of the Precautionary Principle and of appropriate legislation against undue exposure is warranted, including a substantial lowering of permitted MF exposure limits, currently 100 μT . In the case of high voltage overhead powerlines, these should not be built close to houses or farms where cattle and poultry are housed.

The available evidence on adverse health effects of MF exposure speaks for itself. No longer can we talk of differing opinions of whether or not there are such adverse health effects: the question is not about what people think, rather it is about what the evidence says.

Official review bodies are usually constrained by their Terms of Reference and have not been in a position to access the bulk of our scientific knowledge of MF interactions with biological systems. As I will explain below, I estimate that such bodies have at most addressed only 10% of the available evidence/data.

I will deal in turn with some aspects of the available scientific evidence/data.

1. Epidemiological evidence

The epidemiological evidence of adverse health effects from EMFs from human population studies has emerged continuously in recent years and it continues to do so. Particular emphasis has been placed on MF exposures, although electric field, EF effects continue to be researched. It may be useful to consider what recent official reports have said concerning MF health effect in particular – see summary table attached.

Internationally, the first major report of note was the US NIEHS report of 1999 (see list of acronyms below). This concluded that both adult and childhood leukaemia was associated with EMF

exposure. However, the 2002 IARC report (part of WHO) without apparent reference to the NIEHS conclusions, concluded that childhood leukaemia was the only cancer associated with EMF (note that IARC is only concerned with non-cancer health outcomes). However, the California Department of Health Sciences report, also published in 2002 concluded that increased risk of five health outcomes was associated with MF exposures: (i) childhood leukaemia; (ii) adult leukaemia; (iii) adult brain cancer; (iv) amyotrophic lateral sclerosis, ALS (or motor neurone disease) and (v) miscarriage. More recently the EU SCENIHR report has associated childhood leukaemia and Alzheimer's disease to MF exposures. The 2007 WHO EHC Report appears to prevaricate on a range of health outcomes, admitting to the existence of evidence but saying simply that this is 'not as strong' as for childhood leukaemia. It is noteworthy that the various reported adverse health effects are associated with average MF exposures around or below 1 μ T. In the specific case of childhood leukaemia, a doubling of risk is seen with average exposures above 0.4 μ T.

The 2002 IARC and California Reports are now a little historic, but their findings have set the trend of perceived MF health effects in recent years. Given that these two reports were published at about the same time, a number of commentators have asked why two major reports using presumably the same available data came to quite different conclusions with respect to the many studies of adult leukaemia and adult brain cancer. This led my colleague Professor Mike O'Carroll and me to study what was said in both reports and to publish our findings in a learned peer-reviewed journal (O'Carroll & Henshaw 2007). We focused on adult leukaemia and adult brain cancer. We found that whereas the California report had looked at each individual study and at the overall findings of the studies in aggregate, the IARC report had made no attempt to look at the aggregate data. This was strange because IARC had listed in tables the findings from 33 studies of adult leukaemia and 43 studies of adult brain cancer. It was quite clear from inspection of these tables that there was a clear dominance of studies reporting a positive association with MF exposure. In the case of adult leukaemia, the association was, if anything, stronger than that for childhood leukaemia. In O'Carroll & Henshaw we concluded: *"IARC shows no evidence of considering the aggregation of results other than subjectively. It considered individual studies but this led to a tendency to fragment and dismiss evidence that is intrinsically highly significant"*.

Naturally, I am critical of the 2002 IARC report for not carrying out a rather basic analysis of the overall data. However, this tendency has been repeated in later WHO Reports and by the UK NRPB (now subsumed into the HPA). In fact, these later reports fail to cite or in anyway discuss the conclusions of the California Report. I have to say that this is simply bad science and indeed it is unprofessional. Were any of these reports submitted for publication to a good scientific journal, failure to pick up these failures of citation and basic analysis would be picked up by the blind peer-review system and the reports would not be published. Instead, sadly, they enjoy a rather false sense of respectability. I am bound to say that Governments and Power Companies are being poorly advised if they seek to reply solely on advice from these sources.

Notwithstanding this situation, as mentioned above, the February 2009 update of the EU SCENIHR report has added Alzheimer's disease as associated with MF exposures, based on recent studies that were not available to the earlier review bodies. Alzheimer's disease is highly prevalent in the aging population and of considerable public health significance. Of special note is the 1.5 to 2-fold increase in risk specifically seen near powerlines in Switzerland (Huss *et al.* 2008).

2. Magnetic fields and living systems

I now expand on my above comment that official review bodies have accessed at most only 10% of the relevant scientific data. The areas where MF interactions with living systems have been extensively discussed are:

1. The known ability of birds and other animals to detect tiny changes in the Earth's magnetic field (the Geomagnetic or GM) for the purposes of navigation.

2. The ability of plants to sense magnetic fields including power frequency AC fields.
3. Health effects arising from fluctuations in GM fields
4. The use of magnetic fields, including levels below the ICNIRP limit for medical treatment in wound & bone healing.

I will refer below to the 2008 Bioinitiative Report, but here is an extract of what it says about the use of MFs for medical treatment:

"Another Way of Looking at EMFs: Therapeutic Uses

Many people are surprised to learn that certain kinds of EMFs treatments actually can heal. These are medical treatments that use EMFs in specific ways to help in healing bone fractures, to heal wounds to the skin and underlying tissues, to reduce pain and swelling, and for other postsurgical needs. Some forms of EMFs exposure are used to treat depression. EMFs have been shown to be effective in treating conditions of disease at exposure levels far below current public exposure standards. This leads to the obvious question. How can scientists dispute the harmful effects of EMF exposures while at the same time using forms of EMF treatment that are proven to heal the body?

Medical conditions are successfully treated using EMFs at levels below current public safety standards, proving another way that the body recognizes and responds to low-intensity EMF signals. Otherwise, these medical treatments could not work. The FDA has approved EMFs medical treatment devices, so is clearly aware of this paradox.

Random exposures to EMFs, as opposed to EMFs exposures done with clinical oversight, could lead to harm just like the unsupervised use of pharmaceutical drugs. This evidence forms a strong warning that indiscriminate EMF exposure is probably a bad idea.

No one would recommend that drugs used in medical treatments and prevention of disease be randomly given to the public, especially to children. Yet, random and involuntary exposures to EMFs occur all the time in daily life.

I would add that medical treatment is normally given for a fixed period and not continuously and chronically as for an MF exposure near powerlines.

It is in the field of animal navigation that most progress is currently being made in elucidating the primary mechanism by which MFs are known to interact with biological systems. The scientific literature in this field is vast but reference to five recent publications is given below (Ritz *et al.* 2000, 2004 & 2009; Begall *et al.* 2008, Burda *et al.* 2009). Current research suggests that birds possess a magnetic compass in the eye which functions by means of a process which is deeply rooted in chemistry known as the Radical Pair Mechanism. This is the mechanism by which low intensity MFs can increase the lifetime of free radicals. In birds, magneto-reception appears to occur in biological molecules known as cryptochromes, the same molecules that have been associated with magneto-reception in plants. Crucially, cryptochromes are present in human tissues generally, so here too they could be responsible for the primary detection of magnetic fields in man (though I stress such research has not yet been carried out). Whereas in birds the MF-induced increase in lifetime of free radicals is detected for the purposes of navigation, in general such an increase results in their greater ability to cause biological damage, especially in DNA.

The way in which MFs affect biological is becoming increasingly understood. A detailed description and excellent summary may be found in the BioInitiative Report. Here are some extracts from Section 1 (note that this report also discusses health effects from radio frequency RF exposures, principally from mobile phones. The term 'ELF' refers to power frequency EMFs):

Page 17: Both ELF and RF exposures can be considered genotoxic (will damage DNA) under certain conditions of exposure, including exposure levels that are lower than existing safety limits.

Very low-level ELF and RF exposures can cause cells to produce stress proteins, meaning that the cell recognizes ELF and RF exposures as harmful. This is another important way in which scientists have documented that ELF and RF exposures can be harmful, and it happens at levels far below the existing public safety standards.

Page 18: There is substantial evidence that ELF and RF can cause inflammatory reactions, allergy reactions and change normal immune function at levels allowed by current public safety standards.

Page 19: Oxidative stress through the action of free radical damage to DNA is a plausible biological mechanism for cancer and diseases that involve damage from ELF to the central nervous system.

3. The 2007 BioInitiative Report

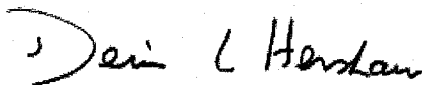
This is an independent report on EMF health effects, which covers both power frequency MFs and radio frequency EMFs such as from mobile phones. The authors include three former Presidents of the International Bioelectromagnetics Society and it presents an authoritative view of the state of the science and the need for precaution against exposure. The report may be accessed at: <http://www.bioinitiative.org/index.htm>

4. Summary

It is notable that some countries took action many years ago to limit public exposure to magnetic fields associated with high voltage powerlines, for example Sweden in 1996, Switzerland and Italy in 2000. Included in the substantial literature of EMF health effects is the 2007 study by Lowenthal *et al.* of increased risk of lymphoproliferative and myeloproliferative disorders in Tasmania.

It is indeed unfortunate that power companies and some governments continue to be ill advised on the adverse health effects of EMF exposures. In the case of overhead powerlines, we really are passed the stage where we should be erecting overhead powerlines close to house and centres of population.

Yours sincerely



Denis L Henshaw

Review bodies' assessments of EMF causation of various diseases.
- health outcomes classified as Class 2B - possible causal

Disease	IARC ¹ 2002	NIEHS 1999 ²	California 2002	EU SCENIHR ³ February 2009
1. Childhood Leukaemia	Yes	Yes	Yes	Yes
2. Adult Leukaemia		Yes	Yes	
3. Adult brain cancer			Yes	
4. Miscarriage			Yes	
5. ALS ⁴			Yes	
6. Alzheimer's disease				Yes ⁵
7. Childhood brain tumours				Emerging evidence

¹International Agency for Research on Cancer

²US National Institute of Environmental Sciences

³EU Scientific Committee on Emerging and Newly Identified Health Risks

⁴Possible effects of Electromagnetic Fields (EMF) on Human Health

⁵Motor neurone disease

⁶Studies only recently published

Table Note. A doubling of childhood leukaemia risk is seen for average exposures above 0.4 μ T. Other health risks refer generally to increased risk around or below 1 μ T average exposure. The current ICNIRP exposure guidelines are set at 100 μ T, 250 times higher than 0.4 μ T where the doubling of childhood leukaemia risk is seen.

Acronyms

HPA: Health Protection Agency (UK)

IARC: International Agency for Research on Cancer (a branch of WHO)

ICNIRP: International Commission on Non-ionising Radiation Protection

NIEHS: National Institute of Environmental Health Sciences (USA)

NRPB: National Radiological Protection Board (UK)

SCENIHR: Scientific Committee on Emerging and Newly Identified Health Risks (EU)

WHO: World Health Organisation

WHO EHC: World Health Organisation Environmental Health Criteria

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For immediate release - NA-PAW and EPAW

July 19 2012

Prominent physician and surgeon Dr. Robert McMurtry calls for wind turbine moratorium

Dr. Bob McMurtry, a prominent member of the Canadian health establishment, joins the victims of industrial wind turbines (IWT's) in their call for Health Canada to turn over their future wind turbine noise study to Canadian Institutes of Health Research (CIHR). While the study is being conducted, they demand an immediate moratorium on all pending and proposed IWT projects.

The victims are represented by the North American Platform Against Wind Power (NA-PAW), and the European Platform Against Windfarms (EPAW), which regroup over 600 associations of victims from 26 countries. These federations, and Dr. McMurtry, are dissatisfied with the way the study is to be conducted. Health Canada (HC) being an arm of the Canadian government, they say, it offers no guarantee as to impartiality, which is the most crucial point in this matter.

Arm's length studies could be assured with involvement from CIHR, according to Dr Robert McMurtry: "research into adverse health effects is a good idea, but is being addressed by the wrong agency which is a regulatory branch of Health Canada. A better approach is to assign the task to the Canadian Institutes of Health Research, which reports to Minister Aglukkaq and is more capable of establishing causation, prevalence, and answering other important questions."

Recently obtained Health Canada Scientific Advisory Board documents reveal that HC have already agreed to not let the results be "causative," and not become a tally of how many people have been affected. These are the first signs that, already, the study is being used as a political stratagem, says Sherri Lange, of NA-PAW. She warns: "the study, if conducted by Health

San Diego County Planning Commission
July 20, 2012 – Handout
Item #1, Wind Energy Ordinance Amendment (POD10-007)

Late Submittal
Item 1, POD 10-007

As a result of the recent passage of Senate Bill 1018(budget trailer bill) the California Energy Commission (CEC) issued a notice July 11, 2012 to advise it is immediately "closing out" the State's Emerging Renewable Program. This program provides rebates to property owners who install small turbines certified by the CEC. The County's proposed wind ordinance amendment includes a provision that requires small turbines installed in the County to be certified by the CEC to ensure they meet their rated energy standard. As the Emerging Renewable Program is terminating, the CEC will no longer be certifying small turbines. Therefore, staff is recommending that the small turbine certification provision of the proposed ordinance be revised to state:

Turbine Certification. The small wind turbine shall be certified by the California Energy Commission, listed on the May 23, 2012, California Energy Commission, List of Eligible Small Turbines or determined to be acceptable by the Director of Planning and Development Services.

Including this additional language will ensure the CEC's most current certification list can be utilized to implement the ordinance. The CEC has indicated there is strong stakeholder interest in exploring options to renew or create a similar program. County Staff will continue to monitor the situation and can recommend further revisions during the routine zoning clean-up process should future revisions be required.

Canada, may not provide the clarity and truth that is being demanded by Canadians.”

The victims are also concerned that the best specialists on the matter may not be consulted as they are not listed in the initial list of 25 experts to assist with this study. They also feel that, now that the authorities have finally admitted there could be a health problem, the principle of precaution must be applied and a moratorium must be called immediately.

Dr. McMurtry concurs: “the admission by Health Minister Aglukkaq that there are substantial gaps in our knowledge reveals the absence of evidence-based guidelines. There is thus the need for a moratorium on further IWT development until the requisite evidence of safe placement of wind turbines is available.”

Sherri adds: “several families and physicians have reported wind turbine associated heart attacks, and even suicides. When a family has lost home enjoyment and restful sleep, with no chance of recovering them, we have a recipe for despair. We cannot afford to wait another two years and a thousand more turbines till the study is done. The devastation of lives must stop immediately.”

We can’t look to Europe for a solution to the health problem, says Mark Duchamp of EPAW. “Denmark recently conducted a study on the matter, but it was done by a consultant whose main client is the wind industry. As a result, it wasn’t truthful, and monstrous 3 MW turbines continue to be installed too close to homes and workplaces at great risk to public health. Tricks were used in the measurements of low-frequency noise and infrasound, as denounced by Professor Henrik Moeller, a renowned acoustician from the University of Aalborg (1). In the circumstances, the world is looking at Ontario for, at last, an unbiased study. That must be the work of CIHR.”

The federations demand the participation of the following specialists in the study:

Dr. Robert Y. McMurtry, M.D., F.R.C.S. (C), F.A.C.S., Canada; Carmen Krogh, BSc Pharm, Researcher Wind Turbines - Adverse Health and Social Justice, Canada; Stephen Ambrose, Acoustician, USA; Dr. Jeffery Aramini, Epidemiologist, Canada; Dr Arline Bronzaft, Noise and Health Specialist, USA; Dr Steven Cooper, ENG Fellow Australian Acoustical Society and Member of Institute of Noise Control, USA; Professor Phillip Dickinson, Acoustician, New Zealand; Barbara J. Frey BA, MA and Peter J. Haddon, BSc, FRICS, Scotland; Dr Christopher Hanning, BSc, MB, BS, MRCS, LRCS, LRCP, FRCA, MD, Sleep Disturbance and Wind Turbines, UK; Professor Colin Hansen, Acoustician, Australia; Dr Magda Havas, Biological and Health Effects of Electromagnetic and Chemical Pollution, Canada; Richard James, INCE Acoustician, USA; Dr Mauri Johansson, Specialist in Community Health

and Occupational Medicine, Denmark; Dr. Sarah Laurie, CEO Waubra Foundation, Australia; Professor Henrik Moeller, Acoustic Specialist, Denmark; Dr. Michael Nissenbaum, Radiologist, USA; Dr. Carl Phillips, Epidemiologist, USA; Dr. Nina Pierpont, Author of Wind Turbine Syndrome, USA; Robert Rand, Acoustician, USA; Dr. Daniel Shepherd, Noise and Health Specialist, New Zealand; Dr Malcolm Swinbanks, Acoustician, UK; Dr. Robert Thorne, Health Sciences and Acoustics, Australia.

Contacts:

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References

- (1) – Tricks used in Denmark: <http://epaw.org/media.php?lang=en&article=pr11>

BOULEVARD PLANNING GROUP

PO Box 1272, BOULEVARD, CA 91905

DATE: 7-13-12

TO: SAN DIEGO COUNTY PLANNING COMMISSIONERS via: Cheryl.jones@sdcounty.ca.gov & MATTHEW SCHNEIDER, PROJECT MANAGER via matthew.schneider@sdcounty.ca.gov

FROM: Donna Tisdale, Chair: 619-766-4170, tisdale.donna@gmail.com

RE: Wind Energy Ordinance & Plan Amendments; POD10-007

At our regular meeting held on July 12, the Group voted unanimously (2 absent) to authorize additional comments. These comments are supplemental to previous comments submitted throughout this Wind Energy Ordinance & Plan Amendment process by our elected community planning group. Previous comments filed on POD 10-007 and the related Tule Wind MUP are hereby incorporated by reference. The project manager has stated that the April 13, 2012 staff report and recommendations are being used for the July 20th hearing. Our requested actions are based on those April 13 documents.

It would be a travesty to amend our Boulevard Community Plan to allow for commercial industrial energy generation and transmission zones, *with incredibly dense concentrations of wind, solar and transmission projects*, after over of a decade of successful hard work and consensus building to keep the rural areas rural due to lack of infrastructure, high fire risk, and need to protect sensitive resources and community character.

It is our hope and desire that you will follow through on your previous statements and expressed sentiments¹ regarding a new direction for the County's renewable energy policies and a lack of desire to exploit our rural communities by changing our hard won Boulevard Community Plan and putting our residents and resources at unnecessary risk—or creating liability related to potential wind turbine related harm and damages.

We also want to remind you that other federal agencies and tribal nations are generally required to reference and address San Diego County wind energy and noise ordinances when planning for wind turbine projects abutting land under County jurisdiction. Lack of adequate

¹ County Planners deal blow to wind industry: <http://eastcountymagazine.org/node/9651> (5-13-12) ; Wind Ordinance hits turbulence: <http://eastcountymagazine.org/node/9354> (4-15-12)

County protections for our community would potentially support similar inadequate protections.

REQUESTED ACTIONS NEEDED TO PROTECT PUBLIC HEALTH AND SAFETY IN DISPROPORTIONATELY IMPACTED RURAL COMMUNITIES, UTILITY AND FIRE INSURANCE RATE-PAYERS, UNIQUE COMMUNITY CHARACTER, WILDLIFE, VISUAL AND NATURAL RESOURCES, PROPERTY VALUES, AND MORE:

1. Reject any approval or adoption of Form of Ordinance (Attachment A) (4-12-12)
2. Reject any adoption of resolution approving General Plan Amendment (GPA) 12-001 (Attachment C) (4-13-12)
3. Deny the changed Major Use Permit Findings as proposed in the Wind Energy Ordinance that remove protections provided by required Findings for other types of projects.
Eliminate the double standard. Our impacted rural low-income communities deserve the same protections from these monster projects as other communities are granted, from much less damaging projects.
4. Address the very real direct, indirect and cumulative adverse impacts, including socio-economic impacts to the most targeted rural communities that includes Boulevard and Jacumba—as required by CEQA and Environmental Justice requirements as defined in California Government Code Section 65040.12 as “the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies.”²
5. Reject large-scale rural wind energy projects as unnecessary, too expensive, too destructive, too inefficient, and for their reliance on new expensive and destructive infrastructure and/or upgrades to existing transmission network.
6. Reject the inadequate, unsupported, and obviously industry influenced July 10 San Diego County Health and Human Services Public Health Statement on Human Health Effects from Wind Turbines that there are no direct pathological effects from wind turbines and any potential impacts on humans can be minimized by following existing planning guidelines. The HHS statement is contradicted by the June 6th Manzanita tribe’s letter alerting the Planning Commission to their current wind turbine related health crises and current Health Impact Assessment, and a June 11, 2012 letter from the Falmouth Board of Health³ to the Massachusetts Department of Public Health seeking an immediate health assessments of wind turbine impacts compelled by two years of consistent and persistent complaints, other compelling evidence.
7. Provide staff direction to pursue alternatives to industrial wind turbine projects with a preference for less invasive smaller scale distributed point of use projects that do not

² <http://www.leginfo.ca.gov/cgi-bin/displaycode?section=gov&group=65001-66000&file=65040-65040.12>

³ June 11, 2012 Falmouth Board of Health letter is attached.

require extensive and expensive new transmission lines and/or or major transmission system upgrades. Those alternatives should include but not be limited to increased energy efficiency (net zero buildings) and conservation efforts, point of use solar, smaller vertical axis wind turbines, fuel cells, combined heat and power that uses waste heat to generate energy.

8. Start the process to change the current inappropriate designation of commercial industrial wind turbine projects from Major Impact Service and Utility--to more appropriate commercial heavy industrial designation.
9. At a minimum, initiate a moratorium on large-scale industrial wind turbine projects unless and until the current independent Health Impact Assessment is completed for the Manzanita Band of Kumeyaay Nation⁴, and /or other independent and scientifically valid multidisciplinary peer-reviewed research is completed to determine the real world adverse impacts of allowing industrial wind turbines and related energy infrastructure too close to people and other sensitive resources.

Additional information and issues of concern are being provided in support of our requests. Please advise if you need hard copies of referenced and linked documents:

1. July 11, 2012: Health Canada announced they are conducting a Health Impact Study into the relationship between wind turbine noise and health effects reported by nearby residents.⁵
2. June 11 2012: Falmouth Board of Health letter to Massachusetts Dept of Public Health⁶ requesting a wind turbine health impact assessment compelled by two years of consistent and persistent complaints, stating *"We realize that this is an antypical health impact assessment study. The suspect agent of harm is not a food borne, waterborne, or airborne contaminant. Yet, the Wind Turbine Health Impact Study recently completed by the State suggests certain elements of wind turbine operation propagate health impacts potentially as harmful as those caused by organic agents."*
3. March 2012: Health Assessment Suggested Guidelines from the Waubra Foundation's Dr. Sarah Laurie, based on real world adverse impacts from existing wind turbine projects.⁷
4. Buddhist monks are selling their spiritual retreat in the forest of Ae because they can't live near a windfarm. *"Concerned monks submitted evidence to a Scottish parliamentary*

⁴ Manzanita Band Tule Wind MUP comment letter to Planning Commission dated June 6, 2012 (attached)

⁵ Health Canada wind turbine impact study announced:
<http://www.am980.ca/channels/news/local/story.aspx?ID=1736684>

⁶ Falmouth Board of Health letter (attached)

⁷ Health Assessment Guidelines March 2012:
<http://quixoteslaststand.files.wordpress.com/2012/04/healthassessmentsuggestedguidelinesmarch2012.pdf>

inquiry into the government's renewable energy plans, claiming they suffered serious side effects when they were praying within 4 miles of a windfarm. They say these included: pain in the head and chest, heart palpitations, dizziness, dry retching, anger, heightened emotions and crying"

5. 6-7-12: Wind Farm Too Noisy: (Australia) Environmental Court ruling that Te Rere Hau Wind farm owner breached its resource consent , vindicating neighbors that had complained it was too noisy⁸:
6. 7-7-12: Michigan: Wind Noise Dispute Pits Scientists Against State Officials⁹: Regulators disregard scientists work to revise wind energy guidelines.
7. 6-4-12 : 13 minute video¹⁰: Please watch news report from a television station in Adelaide, capital of the State of South Australia, interviews wind turbine victims. The new 3 MW wind turbines installed near the village of Waterloo (now called a ghost town) emit more low-frequency sound than smaller models, and some residents have become ill as far as 10 kilometres away from these machines. One farmer complains of sleep deprivation, yet he lives 2.5 km away from two wind turbines which bring him a revenue of 14,000 Australian dollars a year (about same in US\$). The video also shows a local farmer breaking yolkless eggs in a bowl, stating that his chickens laid normal eggs prior to the turbines moving in. He believes the yolkless eggs are related to stress.
8. Consider renting the Windfall documentary from Netflix¹¹. Award-winning director, Laura Israel, follows one rural New York town's encounter with the reality of industrial wind energy, with interviews of wind turbine neighbors. The same scenario plays out in virtually every targeted community. See movie trailer and film reviews at www.windfallthemovie.com
9. May 17, 2012: Renewable energy developers offering California more than three times the capacity needed to meet the state's renewable energy goal in 2020 are filling up the California ISO's interconnection queue¹².
10. You must address the current CAL ISO documented grid congestion¹³ and limits on transmission capacity/ infrastructure to accommodate additional large-scale energy projects without adding additional \$2 billion plus invasive high voltage 500 kV lines like the Sunrise and Southwest Powerlinks as documented in our previous comments and resolution dated

⁸ <http://www.stuff.co.nz/dominion-post/news/7233887/Wind-farm-too-noisy>

⁹ <http://www.michigancapitolconfidential.com/17194>

¹⁰ <http://www.epaw.org/documents.php?lang=en&article=ns34>

¹¹ <http://dvd.netflix.com/Movie/Windfall/70155482>

¹² <http://www.snl.com/InteractiveX/ArticleAbstract.aspx?id=14917334>

¹³ CALISO technical reports: http://www.caiso.com/Documents/TechnicalReport_cluster1_2DeliverabilityRe-Assessment.pdf & http://www.caiso.com/Documents/RevisedTechnicalBulletin-DeliverabilityRequirements-QueueClusters1-4_Determination-NetQualifyingCapacity.pdf

11. Additional public and private lands and eminent domain would be needed for expanded utility corridors through our fire-prone backcountry and at-risk human and natural communities.
12. Identifying our rural area as a Wind Resource Area and changing our community plan would require all property owners and realtors to disclose the planned conversion of this ruggedly scenic area into an industrial energy / transmission zone.
13. The US fish and Wildlife is caving in under administrative and industry pressure to issue 30-year Eagle kill permits for industrial wind turbine projects¹⁴. SDG&E and Sempra's former lobbyist, David Hayes, is not the Deputy Secretary of Interior with major influence over USFWS eagle guidelines and BLM land use decisions for projects like Tule Wind and other major local projects.
14. US Fish and Wildlife have recommended that "Due to the potential for eagle take, we recommend that the Iberdrola apply for a programmatic eagle take permit for the Tule Wind Project" allowing them to kill Golden Eagles in East County¹⁵
15. Shu'luuk Wind developers will also need to need to apply for Eagle Take Permits for their new project (aka Campo Wind) proposed for over 4,000 acres of Campo 11,000 plus acres of tribal lands in Boulevard, as stated at a July 11 presentation in San Diego.
16. Cumulative impacts must be fully recognized, disclosed, analyzed, and addressed.
17. Take permits are also required for Pattern Energy's Ocotillo Wind now under construction just east of Tule Wind. The same may be true for the proposed Jewel Valley Wind, Manzanita Wind, Shu'luuk Wind, Energia Sierra Juarez Wind, and pending wind energy applications in the Cleveland National Forest in the Kitchen Creek and Fred Canyon areas, in addition to the four proposed Soitec solar, Enel Jewel Valley Solar, the 5 SolFocus solar projects proposed in the Boulevard /Crestwood area, and the Amonix and BP solar projects proposed near Jacumba.
18. July 2, 2012: Science Daily: German Wind Farms can kill bats from near and far, research suggests¹⁶:
19. Overall cumulative impacts form projects documented in the multi-agency Renewable Energy Action Team (REAT) map must also be considered¹⁷.
20. Oxymoronic Wind Power:¹⁸ (excerpt) "Widespread misunderstanding about the difference between energy and power has given cover to the charlatan-like wind lobby which pretends their wares provide something they do not. We are all familiar with blackwhite PR jargon that characterizes wind projects as mills, farms, and parks, despite

¹⁴ <http://www.utsandiego.com/news/2012/jul/09/eagle-kill-permits-stoke-constrroversy/>

¹⁵ USFWS Eagle Act memo to Iberdrola dated 10-14-11

¹⁶ German Wind Farms kill bats: <http://www.sciencedaily.com/releases/2012/07/120702133529.htm>

¹⁷ http://www.energy.ca.gov/33by2020/documents/renewable_projects/REAT_Generation_Tracking_Projects_Map.pdf

¹⁸ <http://www.masterresource.org/2011/01/wind-howlers-part-i/> & <http://www.masterresource.org/2011/01/windspeak-part-ii/>

the looming industrial presence of 450-foot tall turbines propelling rotors at tip speeds of nearly 200-mph for many miles along terrain or seabed."

21. Political Capitalism: Risky Business¹⁹: (excerpt) *"Three points can be made in conclusion. One, the free market is a democratic process that is run by the "other 99 percent" (think current anti-Wall Street protesters). "It is precisely the fact that the market does not respect vested interests that makes the people concerned ask for government interference," noted economist Ludwig von Mises in his 1949 classic, Human Action. [6]Two, the societal goal of elevating consumer-driven markets over politically engineered ones needs business reform, not only political reform. As Milton Friedman reminds us: "With some notable exceptions, businessmen favor free enterprise in general but are opposed to it when it comes to themselves."Three, bypassing the democracy of the free market to prop up bad business is risky business all around. For the business, there are the higher costs of lobbying and public relations and very real prospect of ultimate failure at other people's expense. For the politician, there is voter backlash at business favoritism gone bad. And for taxpayers and voters, it is democracy in deficit."*
22. IRS loses much-watched Scottish Power (Iberdrola Renewables) tax case²⁰: The IRS challenged \$932 million in interest deductions taken by the power utility on \$4 billion in intercompany notes issued between company units. The IRS argued that the transactions should be treated as equity, which would nullify the deductions taken by the Spanish-owned company. Under corporate tax law, interest paid on debt is tax deductible, a feature of the U.S. tax code that is often abused and that critics say unwisely favors debt over equity. In this case, Scottish Power's deductions cut its taxable U.S. income. The IRS has been scrutinizing corporate debt issuance to foreign units for years; at times arguing deals are structured to skirt billions of dollars in tax. The Scottish Power ruling is the Tax Court's first major decision in this area since the late 1990s
23. Please review the EMF and RF Emission Products Devices and Their Intensities document to better understand the nature and source of these polluting emissions that we are so concerned with.²¹

Thank you for your consideration of our comments and valid concerns. Please move forward with extreme precaution and care. Your decisions and actions will have far reaching impacts on our rural residents and at-risk resources. There are better, cheaper, less invasive alternatives.

###

¹⁹ <http://www.instituteeforenergyresearch.org/2011/10/21/political-capitalism-risky-business/>

²⁰ http://www.msnbc.msn.com/id/47880162/ns/world_news-europe/t/irs-loses-scottish-power-tax-deductions-case/ ;
<http://www.snl.com/InteractiveX/ArticleAbstract.aspx?id=14917334>

²¹ EMF and RF Emission_Products_Devices and Their Intensities:
[http://www.eaglecliffs.com/HTMLobj-280/EMF and RF Emission.pdf](http://www.eaglecliffs.com/HTMLobj-280/EMF_and_RF_Emission.pdf)



Falmouth Health Department

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(508) 495-7485 • FAX (508) 548-4290

POD 10-007, Item 1

June 11, 2012

Ms. Suzanne Condon
Associate Commissioner
Massachusetts Department of Public Health
250 Washington Street, 7th Floor
Boston, MA 02108

Dear Ms. Condon,

The Falmouth Board of Health requests that **Mass DPH immediately initiate a health assessment of the impacts of the operation of wind turbines in Falmouth.** This appeal is compelled by two years of consistent and persistent complaints of health impacts during turbine operation.

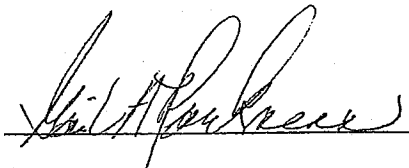
We realize that this is an atypical health assessment study. The suspected agent of harm is not a food borne, waterborne, or airborne contaminant. Yet, the Wind Turbine Health Impact Study recently completed by the State suggests certain elements of wind turbine operation propagate to health impacts potentially as harmful as those caused by organic agents.

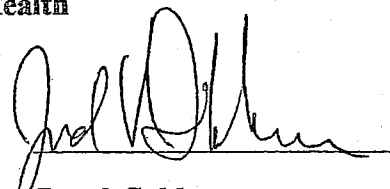
To assist Mass DPH in the identification of health effects and potential study subjects, the Falmouth Board of Health held a hearing on May 24th, 2012, at which we accepted further testimony from those individuals in our community who believe they are experiencing negative health impacts from the operation of three turbines in Falmouth. We have attached a summary, received testimony, and a map of respondents. We are appealing to the Mass DPH to conduct this study due to its ability to collect and analyze confidential health information.

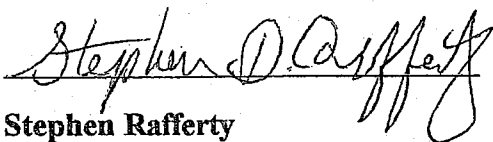
Due to the increasing intensity of the reported health impacts, the Board is considering emergency actions. To determine the appropriateness of such actions, the Board requests immediate guidance on interim measures to protect the health of affected individuals while the complete health assessment is being conducted.

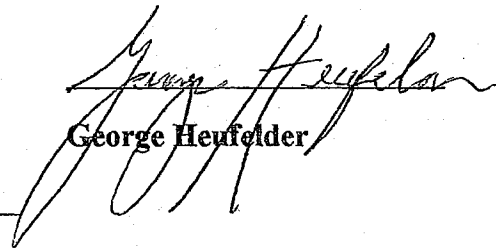
We look to your Department, as that which holds the highest duty to protect the health of the citizens of the Commonwealth, to assist us in this matter. Accordingly, we request a meeting at the earliest possible time with you or your staff. We are certain that once you have read the attached testimony that we received, you will appreciate the urgency and need for such a meeting. That meeting can be coordinated through our Health Agent, David Carignan.

Falmouth Board of Health


Gail Harkness, Chairman


Jared Goldstone


Stephen Rafferty


George Heufelder

John Waterbury

Cc: Falmouth Board of Selectmen

Mr. Julian Suso, Falmouth Town Manager

The Honorable Therese Murray, The State Senate, Boston, Massachusetts

The Honorable David Vieira, Massachusetts House of Representatives

The Honorable Timothy Madden, Massachusetts House of Representatives

Enclosures

RENEWABLE ENERGY ACTION TEAM - GENERATION TRACKING FOR RENEWABLE PROJECTS				
Revised 6/11/12				
PROJECT NAME	County	DEVELOPER	MW	Type
Solar PV				
1 Pristine Sun, LLC/Kara Haugen	Fresno	Pristine Sun, LLC/Kara Haugen	2.0	Solar PV
2 Tranquility	Fresno	Recurrent Energy	400.0	Solar PV
3 Silverado Power (1)	Fresno	Silverado Power, LLC	90.0	Solar PV
4 Silverado Power (3)	Fresno	Silverado Power, LLC	70.0	Solar PV
5 Silverado Power (2)	Fresno	Silverado Power, LLC	63.0	Solar PV
6 Five Points Solar Park	Fresno	Frontier Renewables, LLC	50.0	Solar PV
7 Silverado Power (4)	Fresno	Silverado Power, LLC	40.0	Solar PV
8 RE Adams East	Fresno	RE Adams East, LLC (Owned by Recurrent)	37.0	Solar PV
9 Gestamp Solar (2)	Fresno	Gestamp Solar	23.0	Solar PV
10 Gestamp Solar (c/o Francisco Sanchez)	Fresno	Gestamp Solar	20.0	Solar PV
11 Rose Solar	Fresno	Rose Solar, LLC	20.0	Solar PV
12 Placer Solar	Fresno	Placer Solar, LLC	20.0	Solar PV
13 Three Rocks Solar	Fresno	Three Rocks Solar, LLC	13.0	Solar PV
14 Gestamp Solar (c/o Marco Lara)	Fresno	Gestamp Solar	12.0	Solar PV
15 Gestamp Solar	Fresno	Gestamp Solar	9.0	Solar PV
16 Cenergy Power	Fresno	Cenergy Power (Part of BAP POWER Corp.	3.0	Solar PV
17 Schindler South Solar Center	Fresno	Schindler South Solar Center, LLC	54.0	Solar PV
18 Fowler Packing/Jeff Gatzka	Fresno	Don Pickett & Associates	8.5	Solar PV
19 Annedale Solar	Fresno	Annedale Solar, LLC	33.0	Solar PV
20 Gestamp Asetym Solar	Fresno	Gestamp Solar	22.0	Solar PV
21 Gestamp Solar Asetym (2)	Fresno	Gestamp Solar	22.0	Solar PV
22 Sunpower	Fresno		270.0	Solar PV
23 Brannon Solar	Fresno	Brannon Solar, LLC	22.0	Solar PV
24 Jayne East	Fresno	Recurrent Energy	20.0	Solar PV
25 Kamm	Fresno	Recurrent Energy	20.0	Solar PV
26 SR Solis Oro Loma	Fresno	SolarGen USA, LLC	19.0	Solar PV
27 SR Solis Oro Loma Teresina	Fresno	SolarGen USA, LLC	19.0	Solar PV
28 SR Solis Firebaugh	Fresno	SolarGen USA, LLC	7.0	Solar PV
29 CalRenew-1	Fresno	Cleantech America	5.0	Solar PV
30 SR Solis East Reedley	Fresno	SolarGen USA, LLC	7.0	Solar PV
31 SR Solis City of Huron	Fresno	SolarGen USA, LLC	5.0	Solar PV
32 GA Solar	Fresno	GA Solar	22.0	Solar PV
33 Gestamp Solar Enrio	Fresno	Gestamp Solar	26.0	Solar PV
34 Gestamp Solar Matson	Fresno	Gestamp Solar	26.0	Solar PV
35 Huron	Fresno	PG&E	20.0	Solar PV
36 San Joaquin	Fresno	PG&E	20.0	Solar PV
37 Schindler 1 and 2	Fresno	PG&E	30.0	Solar PV
38 Westlands Solar Farm	Fresno	Westlands Solar Farms, LLC	23.0	Solar PV
39 Whitney Point Solar	Fresno	Whitney Solar LLC	40.0	Solar PV
40 Vie Del Solar Project	Fresno	Vie-Die Company	1.0	Solar PV
41 North Star Solar 1	Fresno	North Ligh Power LLC	60.0	Solar PV
42 Thunderhill	Glenn	THSP LLC	38.0	Solar PV
43 AES Solar Imperial Valley PV*	Imperial	AES Solar (formerly Tessera Solar)	928.0	Solar PV
44 Dixieland Solar Farm	Imperial	Dixieland Solar Farm, LLC	20.0	Solar PV
45 Superstition Solar	Imperial	Superstition Solar	500.0	Solar PV
46 Centinela Solar	Imperial	LS Power	275.0	Solar PV
47 Ocotillo Sol	Imperial	SDG&E	15.0	Solar PV
48 Midway Solar Farm I	Imperial	8MinuteEnergy Renewables LLC	50.0	Solar PV
49 Salton Sea Solar Farm I	Imperial	8MinuteEnergy Renewables LLC	50.0	Solar PV
50 Salton Sea Solar Farm II	Imperial	8MinuteEnergy Renewables LLC	100.0	Solar PV
51 Calixico I	Imperial	8MinuteEnergy Renewables LLC	200.0	Solar PV
52 Midway Solar Farm III	Imperial	8MinuteEnergy Renewables LLC	200.0	Solar PV
53 Calipatria Solar Farm II	Imperial	8MinuteEnergy Renewables LLC	100.0	Solar PV
54 Calipatria Solar Farm I	Imperial	8MinuteEnergy Renewables LLC	50.0	Solar PV
55 Chocolate Mountains Solar Farm	Imperial	8MinuteEnergy Renewables LLC	50.0	Solar PV
56 Imperial Valley Solar Co. I	Imperial	Sunpeak	23.0	Solar PV
57 ALIVE Energy Farm	Imperial	ALIVE Industries, Inc.	20.0	Solar PV
58 Energy Source Solar I	Imperial	Energy Source Solar, LLC	80.0	Solar PV
59 Energy Source Solar II	Imperial	Energy Source Solar, LLC	80.0	Solar PV
60 Brawley	Imperial	Ormat	20.0	Solar PV

	PROJECT NAME	County	DEVELOPER	MW	Type
61	C Solar South	Imperial	Lightsource Renewables	200.0	Solar PV
62	Bannister	Imperial	Franconia Investments LLC	250.0	Solar PV
63	Calixco II	Imperial	8 Minute Energy	200.0	Solar PV
64	Mount Signal Solar Farm III	Imperial	8 Minute Energy	200.0	Solar PV
65	Midway Solar Farm II	Imperial	8 Minute Energy	155.0	Solar PV
66	C Solar West	Imperial	Lightsource Renewables	250.0	Solar PV
67	Heber	Imperial	Ormat	10.0	Solar PV
68	Kingbird Solar	Kern	First Solar	40.0	Solar PV
69	Fremont Valley Preservation Water Bank & Solar Project	Kern		900.0	Solar PV
70	Wasco-Charca	Kern	Solar Land Partners	8.0	Solar PV
71	Chaparral Solar	Kern	Iberdrola	30.0	Solar PV
72	Meadows Field Solar Project	Kern		0.8	Solar PV
73	Maricopa Sun Solar	Kern	Granville Homes	700.0	Solar PV
74	Oro Verde Solar (Edwards AFB)	Kern	Fotowatio Renewable Ventures	450.0	Solar PV
75	Gateway Solar Project	Kern	East Kern Properties, LLC	350.0	Solar PV
76	Willow Springs Solar Array	Kern	First Solar	160.0	Solar PV
77	Rosamond Solar Project	Kern	Sempre	120.0	Solar PV
78	Cygnus Solar	Kern	Fotowatio Renewable Ventures	80.0	Solar PV
79	Weldon Solar Project	Kern	Renewable Resources	60.0	Solar PV
80	Orion Solar	Kern	Fotowatio Renewable Ventures	20.0	Solar PV
81	Ridge Rider Solar Park	Kern	Global Real Estate Investment Partners, LLC	38.0	Solar PV
82	Mojave Solar 1	Kern	Fotowatio Renewable Ventures	20.0	Solar PV
83	Rosamond I	Kern	Recurrent Energy	20.0	Solar PV
84	Columbia II	Kern	Recurrent Energy	20.0	Solar PV
85	Old River II	Kern	Recurrent Energy	17.0	Solar PV
86	Old River I	Kern	Recurrent Energy	16.0	Solar PV
87	Goose Lake Solar	Kern	EnXco	15.0	Solar PV
88	Columbia III	Kern	Recurrent Energy	10.0	Solar PV
89	Elk Hills Solar	Kern	EnXco	7.0	Solar PV
90	San Bernard Solar	Kern	EnXco	6.0	Solar PV
91	Great Lakes	Kern	Recurrent Energy	5.0	Solar PV
92	Rio Grande	Kern	Recurrent Energy	5.0	Solar PV
93	Avenida Del Sol Solar Project	Kern	Avenida del Sol Solar	5.0	Solar PV
94	Smyrna Solar	Kern	EnXco	20.0	Solar PV
95	Rosamond II	Kern	Recurrent Energy	20.0	Solar PV
96	Porter and Associates	Kern	Porter and Associates	20.0	Solar PV
97	Monte Vista	Kern	First Solar	126.0	Solar PV
98	Cal City Solar	Kern	EnXco	96.0	Solar PV
99	SR Solis City of McFarland	Kern	SolarGen USA, LLC	20.0	Solar PV
100	Barren Ridge I	Kern	Recurrent Energy	74.0	Solar PV
101	Barren Ridge Solar	Kern	enXco	100.0	Solar PV
102	Columbia I	Kern	Recurrent Energy	20.0	Solar PV
103	McFarland Solar Energy Project	Kern	Integrated Resourced Development, LLC	18.0	Solar PV
104	Mojave Solar	Kern	Horizon Wind	10.0	Solar PV
105	Rosamond Solar Array	Kern	First Solar	155.0	Solar PV
106	San Bernard	Kern	PG&E	20.0	Solar PV
107	SinarPower	Kern	SinarPower, Inc.	4.0	Solar PV
108	Sirius Solar	Kern	Boulevard Associates, LLC	20.0	Solar PV
109	SunGen 1	Kern	Complete Energy/La Paloma Generating Co. LLC	29.0	Solar PV
110	Champagne Solar	Kern	Iberdrola	40.0	Solar PV
111	CSU Bakersfield Photovoltaic Project	Kern	CSU Bakersfield	1.2	Solar PV
112	Rigel	Kern	Fotowatio Renewable Ventures	20.0	Solar PV
113	Tehachapi Solar II	Kern	Recurrent Energy	20.0	Solar PV
114	High Desert Solar	Kern	Element Power	20.0	Solar PV
115	South Kern Solar	Kern	Ridgeline Energy LLC	20.0	Solar PV
116	Twisselman Solar	Kern	Ridgeline Energy LLC	10.0	Solar PV
117	Calwest Energy	Kern	Jonathan Bender	5.0	Solar PV
118	Cenergy Power	Kern	Cenergy	1.5	Solar PV
119	Lost Hills	Kern	Nextlight	33.0	Solar PV
120	Tehachapi Solar I (1 of 10 RE projects same EIR)	Kern	Recurrent Energy	20.0	Solar PV
121	Power Partners Southwest	Kern	Power Partners Southwest LLC	25.0	Solar PV
122	Bakersfield Fuel and Oil Solar Project	Kern	Bakersfield Fuel and Oil	20.0	Solar PV
123	Lerdo Detention Facility	Kern	Lerdo Detention Center	2.0	Solar PV

	PROJECT NAME	County	DEVELOPER	MW	Type
124	Antelope Valley Solar	Kern / Los Angeles	SunPower/Renewable Resources Group	650.0	Solar PV
125	Mustang	Kings	Recurrent Energy	200.0	Solar PV
126	Sand Drag (Sun City 2)	Kings	NRG Solar	19.0	Solar PV
127	SR Solis Avenal	Kings	SolarGen USA, LLC	18.0	Solar PV
128	Avenal Park	Kings	Eurus Energy	9.0	Solar PV
129	Solar Generation Facilities Project	Kings	Corcoran Irrigation District	40.0	Solar PV
130	Sunpower Henrietta	Kings	River West Investments	136.0	Solar PV
131	Jacobs Corner	Kings	Jacob Canal Solar Farm, LLC;	60.0	Solar PV
132	Grangeville	Kings	Recurrent Energy	20.0	Solar PV
133	Stratford Land	Kings	Eurus Energy	20.0	Solar PV
134	RE Kansas	Kings	Recurrent Energy	20.0	Solar PV
135	RE Lincoln	Kings	Recurrent Energy	15.0	Solar PV
136	US Topco Energy (CUP 12-02)	Los Angeles	US Topco Energy LLC	7.5	Solar PV
137	Horn PV	Los Angeles	Sunlight Partners	1.5	Solar PV
138	Silverado Power (CUP 12-08)	Los Angeles	Silverado Power	20.0	Solar PV
139	Silverado Power (CUP 12-09)	Los Angeles	Silverado Power	40.0	Solar PV
140	TA High Desert	Los Angeles	Tuusso Energy	20.0	Solar PV
141	Del Sur Solar	Los Angeles	First Solar	50.0	Solar PV
142	Gray Butte Solar PV	Los Angeles	First Solar and AES Solar	150.0	Solar PV
143	Rio Vista Water Treatment Plant	Los Angeles	Castaic Lake Water Authority	1.0	Solar PV
144	UC/CDWR Joint Solar Project	Los Angeles	CDWR/UC	20.0	Solar PV
145	Beautiful Earth	Los Angeles	Beautiful Earth Group	39.0	Solar PV
146	Alpine Solar Project	Los Angeles	NRG	92.0	Solar PV
147	Antelope Solar 2	Los Angeles	Recurrent Energy	10.0	Solar PV
148	Ruby Solar Project	Los Angeles	Ruby Solar LLC	20.0	Solar PV
149	Antelope Solar Project	Los Angeles	Tuusso Energy	20.0	Solar PV
150	AV Solar Ranch One	Los Angeles	First Solar	230.0	Solar PV
151	LA Solar 20	Los Angeles	LA Solar 2	20.0	Solar PV
152	Antelope Solar 1	Los Angeles	Recurrent Energy	10.0	Solar PV
153	Antelope Solar Farm (Mojave Solar 4)	Los Angeles	Fotowatio Renewable Ventures	20.0	Solar PV
154	American Lake	Los Angeles	Greenworks/Silverado Power	20.0	Solar PV
155	Russell	Los Angeles	Sunlight Partners	2.5	Solar PV
156	Vandiver	Los Angeles	Sunlight Partners	3.0	Solar PV
157	Beazel	Los Angeles	Sunlight Partners	1.5	Solar PV
158	Reuschel	Los Angeles	Sunlight Partners	2.0	Solar PV
159	East Lancaster Ranch	Los Angeles	Silverado Power	4.0	Solar PV
160	Sierra Solar	Los Angeles	Greenworks/Silverado Power	20.0	Solar PV
161	Desert Vista	Los Angeles	Greenworks/Silverado Power	25.0	Solar PV
162	Lancaster	Los Angeles	WAD/Silverado Power	5.0	Solar PV
163	American Solar	Los Angeles	Greenworks/Silverado Power	35.0	Solar PV
164	Owen	Los Angeles	Sunlight Partners	1.5	Solar PV
165	Theme	Los Angeles	Sunlight Partners	2.0	Solar PV
166	Antelope Solar	Los Angeles	Greenworks/Silverado Power	52.0	Solar PV
167	Antelope Valley	Los Angeles	Greenworks/Silverado Power	5.0	Solar PV
168	North Lancaster Ranch	Los Angeles	Silverado Power	20.0	Solar PV
169	Silver Sun	Los Angeles	Greenworks/Silverado Power	20.0	Solar PV
170	Western Antelope	Los Angeles	Blue Sky Ranch/Silverado Power	40.0	Solar PV
171	Hall	Los Angeles	Sunlight Partners	3.5	Solar PV
172	Sunlight Partners	Los Angeles	Sunlight Partners	1.5	Solar PV
173	Absolutely Solar	Los Angeles	Absolutley Solar	3.4	Solar PV
174	Silverado Power	Los Angeles	Silverado Power	10.0	Solar PV
175	Silverado Power	Los Angeles	Silverado Power	20.0	Solar PV
176	Silverado Power	Los Angeles	Silverado Power	20.0	Solar PV
177	Silverado Power	Los Angeles	Silverado Power	20.0	Solar PV
178	Horizon Energy	Los Angeles	Horizon Energy	1.5	Solar PV
179	Sunlight Partners	Los Angeles	Sunlight Partners	4.0	Solar PV
180	Sunlight Partners	Los Angeles	Sunlight Partners	1.5	Solar PV
181	Sunlight Partners	Los Angeles	Sunlight Partners	1.5	Solar PV
182	Absolutley Solar	Los Angeles	Absolutley Solar	3.0	Solar PV
183	Solar Electric Solutions LLC	Los Angeles	Solar Electric Solutions LLC	2.0	Solar PV
184	Blue Diamond Solar Energy	Los Angeles	Blue Diamond Solar Energy	20.0	Solar PV
185	Littlerock Solar Power Generation Station 1 LLC	Los Angeles	Littlerock Solar Power Generation Station 1 LLC	5.2	Solar PV
186	Silverado Power	Los Angeles	Silverado Power	34.0	Solar PV

	PROJECT NAME	County	DEVELOPER	MW	Type
187	Aurora Solar LLC	Los Angeles	Aurora Solar LLC	20.0	Solar PV
188	Sunlight Partners	Los Angeles	Sunlight Partners	2.0	Solar PV
189	Sunlight Partners	Los Angeles	Sunlight Partners	4.0	Solar PV
190	Adera Solar	Madera	Pacific Valley, LLC	20.0	Solar PV
191	CUP #2010-015	Madera	Cal SP V, LLC	20.0	Solar PV
192	Cal SP V	Madera	Cal S.P. V, LLC	20.0	Solar PV
193	Quinto/Los Banos	Merced	Sunpower/River West	110.0	Solar PV
194	SR Solis City of Gustine	Merced	SolarGen USA, LLC	20.0	Solar PV
195	Ingomar CUP	Merced	Ingomar Packing Co.	1.0	Solar PV
196	Leo Solar	Merced	Fotowatio	150.0	Solar PV
197	Blythe Mesa Solar	Riverside	Renewable Resources Group	485.0	Solar PV
198	Garnet Solar Power Generation Station, 1	Riverside	Amonix	2.0	Solar PV
199	Quartzite	Riverside	First Solar	600.0	Solar PV
200	Southwestern Solar Power II	Riverside	Southwestern Solar	13.0	Solar PV
201	Southwestern Solar Power I	Riverside	Southwestern Solar	5.0	Solar PV
202	Avalon Riverside	Riverside	Avalon Solar, LLC	2.0	Solar PV
203	Temescal Canyon RV, LLC	Riverside	Temescal Canyon RV, LLC	2.0	Solar PV
204	McCoy	Riverside	NextEra	250.0	Solar PV
205	Colorado River	Riverside	Sun Power/Renewable Resources	485.0	Solar PV
206	Mountain View PV Project	Riverside	AES Seawest	13.0	Solar PV
207	Desert Hot Springs	Riverside	Solar Electric Solutions	20.0	Solar PV
208	Mule Mountain Soleil	Riverside	EnXco	200.0	Solar PV
209	Maria Vista	Riverside	Bullfrog Green Energy/Wellhead Electric, Inc	500.0	Solar PV
210	McCoy EnXco	Riverside	EnXco	250.0	Solar PV
211	Eagle Mountain	Riverside	EnXco	150.0	Solar PV
212	Gypsum Solar	Riverside	Ridgeline Energy LLC	100.0	Solar PV
213	Indio Solar Project	Riverside	Ridgeline Energy LLC	30.0	Solar PV
214	Desert Center II	Riverside	Ridgeline Energy	20.0	Solar PV
215	Chuckwalla Solar	Riverside	Chuckwalla Solar LLC	200.0	Solar PV
216	Desert Sunlight	Riverside	First Solar	550.0	Solar PV
217	Blythe	Riverside	EC&R Development LLC	250.0	Solar PV
218	Mule Mountain	Riverside	Bullfrog Green Energy, LLC	500.0	Solar PV
219	Belectric (SMUD FIT)	Sacramento	Belectric	21.9	Solar PV
220	RE McKenzie (SMUD FIT)	Sacramento	Recurrent Energy	30.0	Solar PV
221	RE Bruceville (SMUD FIT)	Sacramento	Recurrent Energy	15.0	Solar PV
222	RE Kammerer (SMUD FIT)	Sacramento	Recurrent Energy	15.0	Solar PV
223	RE Dillard (SMUD FIT)	Sacramento	Recurrent Energy	9.4	Solar PV
224	GlobAll Connect (SMUD FIT)	Sacramento	Belectric	4.0	Solar PV
225	Solar Star (SMUD FIT)	Sacramento	Belectric	1.5	Solar PV
226	San Benito Smart Energy Park LLC	San Benito	Smart Park LLC	1.5	Solar PV
227	Panoche Valley	San Benito	PV2 Energy LLC Previously Solargen	399.0	Solar PV
228	Avalon Solar Development	San Bernardino	Amonix INC	1.7	Solar PV
229	Lucerne Valley Desert View Ranch, LLC	San Bernardino	Lucerne Valley Desert View Ranch, LLC	20.0	Solar PV
230	Indigo Solar Project	San Bernardino	Indigo 2010, LLC	20.0	Solar PV
231	Joshua Tree	San Bernardino	Axio Power Holdings	20.0	Solar PV
232	Siberia	San Bernardino	Solar Partners V	60.0	Solar PV
233	Caithness Soda Mountain, LLC	San Bernardino	Caithness Soda Mountain, LLC	350.0	Solar PV
234	El Mirage	San Bernardino	Axio Power Holdings	20.0	Solar PV
235	Lucerne Valley Solar	San Bernardino	Chevron, Fotowatio Renewable Ventures	45.0	Solar PV
236	Lightsource Renewables, LLC	San Bernardino	Lightsource Renewables, LLC	40.0	Solar PV
237	Victor Phelan Solar One	San Bernardino	Recurrent Energy	20.0	Solar PV
238	LSR Kramer South	San Bernardino	Lightsource Renewables	20.0	Solar PV
239	North Edwards Solar	San Bernardino	North Edwards Solar	20.0	Solar PV
240	Strawberry Peak	San Bernardino	First Solar	15.0	Solar PV
241	SEPV2 -Twenty-nine Palms Solar	San Bernardino	Solar Electric Solutions	12.0	Solar PV
242	Lucerne Solar	San Bernardino	NextEra	60.0	Solar PV
243	Suncal Waterman Junction (Barstow)	San Bernardino	Suncal	250.0	Solar PV
244	29 Palms PV Project	San Bernardino	Sustainable Energy Capital Partners	20.0	Solar PV
245	Apple Valley	San Bernardino	Sunlight Partners	1.0	Solar PV
246	Lucerne Valley	San Bernardino	First Solar	15.0	Solar PV
247	Newberry Springs, Soltech Solar Inc.	San Bernardino	Soltech Solar Inc.	1.5	Solar PV
248	Riverbluff	San Bernardino	TerraGen	230.0	Solar PV
249	SolFocus- Deep Creek Road	San Bernardino	SolFocus Solar	1.5	Solar PV

	PROJECT NAME	County	DEVELOPER	MW	Type
250	Wonder Valley	San Bernardino	Wonder Valley 1 LLC	100.0	Solar PV
251	Rabbit Springs Solar Array	San Bernardino	Rabbit Springs Solar LLC	104.0	Solar PV
252	Stateline	San Bernardino	First Solar	300.0	Solar PV
253	Cascade Solar	San Bernardino	Axio Power	18.5	Solar PV
254	Kramer Junction Solar Energy Center	San Bernardino	NextEra	50.0	Solar PV
255	SEPV8, LLC	San Bernardino	Solar Electric Solutions	12.0	Solar PV
256	SEPV9, LLC	San Bernardino	Solar Electric Solutions	9.0	Solar PV
257	Fink Road Solar Farm (Watts)	San Bernardino	Sunlight Partners	2.5	Solar PV
258	Victor Solar 1 El Mirage*	San Bernardino	First Solar	16.0	Solar PV
259	Cal SP VII, LLC	San Bernardino	Cal SP VII, LLC (Solar Pack)	3.0	Solar PV
260	Del Oro Solar	San Bernardino	ReCurrent Energy	20.0	Solar PV
261	Lucerne Valley	San Bernardino	Amonix	1.5	Solar PV
262	Lucerne Valley Solar 1	San Bernardino	California Solar Energy	100.0	Solar PV
263	Silver Valley	San Bernardino	Silver Valley16, LLC	20.0	Solar PV
264	Barstow Housing Solar Farm	San Bernardino	C.F. Properties Inc.	19.0	Solar PV
265	BP Solar (Jacumba)	San Diego	BP Alternative Energy	20.0	Solar PV
266	US Solar Borrego One	San Diego	NRG Borrego Solar One, LLC	46.0	Solar PV
267	Borrego Solar Farm	San Diego	Eurus Energy	45.0	Solar PV
268	Split Mountain Solar Farm	San Diego	EnXco	26.0	Solar PV
269	Digorio	San Diego	Avalon Solar, LLC	2.0	Solar PV
270	BP Solar	San Diego	BP Alternative Energy	20.0	Solar PV
271	GWF Tracy Amendment	San Joaquin	GWF Tracy	30.0	Solar PV
272	Topaz Solar Farm	San Luis Obispo	First Solar	550.0	Solar PV
273	California Valley Solar Ranch	San Luis Obispo	Sun Power	250.0	Solar PV
274	Cuyama Solar Energy Project Phase 1&2	Santa Barbara	First Solar	40.0	Solar PV
275	Gestamp Solar	Solano	Gestamp Solar	28.0	Solar PV
276	McHenry Solar Farm	Stanislaus	Sunpower	30.0	Solar PV
277	Scatech Westside Solar	Stanislaus	Scatech Solar	50.0	Solar PV
278	Fink Road Solar Farm	Stanislaus	JKB Development	100.0	Solar PV
279	CSU Stanislaus PV Project	Stanislaus	CSU Stanislaus	0.8	Solar PV
280	Great Valley	Tulare	Element Power	150.0	Solar PV
281	Alpaugh Solar	Tulare	Solar Project Solutions	50.0	Solar PV
282	DTE Energy I	Tulare	DTE Energy	20.0	Solar PV
283	DTE Energy II	Tulare	DTE Energy	20.0	Solar PV
284	Element Power I	Tulare	Element Power	20.0	Solar PV
285	SR Solis Vestral Almond	Tulare	SolarGen USA, LLC	18.0	Solar PV
286	SR Solis Terra Bella	Tulare	SolarGen USA, LLC	20.0	Solar PV
287	Cal S.P. IV, LLC	Tulare	Cal S.P. IV, LLC	20.0	Solar PV
288	White River	Tulare	Solar Project Solutions	20.0	Solar PV
289	Alpaugh North	Tulare	Solar Project Solutions	20.0	Solar PV
290	SR Solis Rector	Tulare	SolarGen USA, LLC	10.0	Solar PV
291	SR Solis Vestal Herder	Tulare	SolarGen USA, LLC	18.0	Solar PV
292	SR Solis Vestal Fireman	Tulare	SolarGen USA, LLC	19.0	Solar PV
293	SR Solis Crown	Tulare	SolarGen USA, LLC	15.0	Solar PV
294	Alpaugh Atwell Island West	Tulare	Element Power	20.0	Solar PV
295	White River West	Tulare	Solar Project Solutions	20.0	Solar PV
296	OPDE Solar Farm	Yolo	OPDE	24.0	Solar PV
			Total Solar PV MW:	21,448.9	
	Solar Thermal				
297	Ogilby Solar	Imperial	Pacific Solar Investments (Iberdrola)	450.0	Solar Thermal
298	Mule Mountain Bullfrog/Wellhead (Mule Mountain III)	Riverside	Solar Reserve	250.0	Solar Thermal
299	Rabbit Dry Lake Solar	San Bernardino	Southwest Solar	40.0	Solar Thermal
			Total Solar Thermal MW:	740.0	
	Wind				
300	Patterson Pass Repowering Project	Alameda	enXco	20.0	Wind
301	Golden Hills (Altamont Repower II)	Alameda	NextEra	150.0	Wind
302	Tres Vaqueros	Contra Costa	Pattern Energy	42.0	Wind
303	Vasco Wind	Contra Costa	NextEra	78.0	Wind
304	Bear River Ridge	Humboldt	Shell Wind Energy	70.0	Wind
305	Ocotillo Express	Imperial	Pattern Energy Group LP	465.0	Wind
306	Black Mountain	Imperial	Imperial Wind RES	65.0	Wind
307	Avalon Solar	Kern	Enxco	175.0	Wind
308	Avalon I	Kern	EnXco	255.0	Wind

	PROJECT NAME	County	DEVELOPER	MW	Type
309	Alta East	Kern	TerraGen	300.0	Wind
310	Manzana Wind Project	Kern	Iberdola	300.0	Wind
311	Clear Vista Ranch Wind	Kern	Pannon	20.0	Wind
312	Coram ZC 60	Kern	Coram Development	6.0	Wind
313	Soledad Mountain Wind	Kern	Oak Creek Energy	250.0	Wind
314	Windswept	Kern	Western Wind Energy Corp.	72.0	Wind
315	Rising Tree	Kern	Rising Tree Wind, LLC	234.0	Wind
316	Pacific Wind	Kern	EnXco	151.0	Wind
317	Sand Canyon of Tehachapi	Kern	Sand Canyon of Tehachapi	40.0	Wind
318	Lower West Wind Energy Project	Kern	AERO Energy LLC	14.0	Wind
319	Morgan Hills	Kern	TerraGen	230.0	Wind
320	Pine Canyon	Kern	LADWP	150.0	Wind
321	Windstar I	Kern	Aero Energy, LLC - Western Wind Energy	120.0	Wind
322	Sand Canyon	Kern	Eagle Energy/Helo Energy	24.0	Wind
323	Alta Addendum II	Kern	TerraGen	330.0	Wind
324	Alta	Kern	Alta	50.0	Wind
325	Alta East Infill	Kern	TerraGen	132.0	Wind
326	North Sky River Energy, LLC (NSRE)	Kern	NextEra	339.0	Wind
327	Walker Ridge	Lake and Colusa	Alta Gas REP	70.0	Wind
328	Blue Sky	Los Angeles	NextEra	225.0	Wind
329	Lake Hughes Wind	Los Angeles	Vermont Company Wind Farm	60.0	Wind
330	Soledad Wastewater Treatment Plant	Monterey	City of Soledad	3.0	Wind
331	King City Wind Project	Monterey	King City Wind Project	5.0	Wind
332	Whitewater Hill	Riverside	Shell Cabazon	105.0	Wind
333	Wind Power Partners 1993 (California)	Riverside	Wind Power Partners 1993, LLC (Nextera)	40.2	Wind
334	AES Daggett Ridge	San Bernardino	AES Wind Generation, INC	82.5	Wind
335	Granite Wind, LLC	San Bernardino	RES North America	74.0	Wind
336	Sand Ridge	San Bernardino	AES Wind Generation, Inc	61.0	Wind
337	Camp Rock	San Bernardino	Horizon Wind	150.0	Wind
338	West Fry Wind, LLC	San Bernardino	NextEra	34.0	Wind
339	Dagget	San Bernardino	Horizon Wind Energy	25.0	Wind
340	Horizon Wind Energy	San Bernardino	Horizon Wind Energy	25.0	Wind
341	Granite Mountain Wind	San Bernardino	Sierra Renewables	64.4	Wind
342	Cleghorn Ridge Wind	San Bernardino	Pattern Energy Group LP	120.0	Wind
343	Tule Wind	San Diego	Iberdola Renewables	200.0	Wind
344	Jewel Valley	San Diego	Padoma Wind Power LLC/ Enel North America	184.0	Wind
345	Campo Wind	San Diego	Invenergy	160.0	Wind
346	Lompoc Wind Energy Project	Santa Barbara	Pacific Renewable Energy Generation LLC	55.5	Wind
347	Montezuma Wind II	Solano	NextEra	78.0	Wind
348	Shiloh III	Solano	EnXco	118.0	Wind
349	Shiloh IV	Solano	EnXco	100.0	Wind
350	Catalina Renewable Energy	Kern	EnXco	350.0	Wind/Solar PV
351	Wildflower Green Energy Farm	Los Angeles	Farm/Element Power	300.0	Wind/Solar PV
			Total Wind MW:	6,771.6	
	Geothermal				
352	Hudson Ranch II	Imperial	Hudson Ranch	49.0	Geothermal
353	South Brawley	Imperial	Nevada Geothermal Inc	49.0	Geothermal
354	Truckhaven I	Imperial	Nevada Geothermal Inc	49.0	Geothermal
355	Wister - Ormat	Imperial	Ormat	49.0	Geothermal
356	Black Rock 5, 6	Imperial	CalEnergy Obsidian Energy, LLC	235.0	Geothermal
357	Black Rock 7, 8, 9	Imperial	CalEnergy Obsidian Energy, LLC	159.0	Geothermal
358	West Chocolate Geothermal 3	Imperial	Ormat	50.0	Geothermal
359	East Brawley - Ormat	Imperial	Ormat	49.0	Geothermal
360	East Brawley	Imperial	Nevada Geothermal Inc	49.0	Geothermal
361	Casa Diablo Geothermal IV	Mono	Casa Diablo Geothermal	40.0	Geothermal
			Total Geothermal MW:	778.0	
	Other Technologies				
362	Buena Vista Biomass Power	Amador	Otoka Energy	18.0	Biomass
363	Mesquite Lake Cattle Manure Burner	Imperial	Greenhunter	27.0	Biomass
364	Sierra Pacific Industries Cogeneration Power Project	Shasta	Sierra Pacific Industries	31.0	Biomass
365	El Dorado Irrigation District	El Dorado	El Dorado Irrigation District	21.0	Small Hydro
			Total Other MW:	97.0	
			Total All Technologies MW:	29,835.4	

BOULEVARD PLANNING GROUP

PO Box 1272, BOULEVARD, CA 91905

October 5, 2012

San Diego County Planning Commission
Matthew Schneider, Project Manager
San Diego County Planning & Development Services

Via: Matthew.Schneider@sdcounty.ca.gov, cheryl.jones@sdcounty.ca.gov

RE: POD10-007 WIND ENERGY ZONING ORDINANCE AMENDMENTS; TULE WIND

Dear Chairman Pallenger, Commissioners, and Mr. Schneider,

It is our understanding that Tule Wind has requested a continuance for today's noticed Planning Commission hearing on the Tule Wind changes approved by the Board of Supervisors on August 8th.

Regardless, we still want to go on record with last night's unanimous 5-0-0 vote (seat 1 absent and seat 6 vacant) to fully endorse the comment letter submitted by Donna Tisdale on behalf of Backcountry Against Dumps and The Protect Our Communities Foundation, dated October 3, 2012.

We also concur with the request to further continue the Commission hearing on Tule Wind's expected request for exemption from future Wind Energy Zoning Ordinance & Plan Amendment requirements / regulation, until after we have an opportunity to publicly review those comments at our next meeting on November 7th.

Please contact me with any questions at 619-766-4170 or tisdale.donna@gmail.com

Sincerely,

/s/

Donna Tisdale, Chair

Cc: Supervisor Jacob
Planning Group members

**REVISED RESOLUTION IN OPPOSITIN TO THE SAN DIEGO COUNTY
WIND ENERGY ORDINANCE & PLAN AMENDMENT DEIR POD10-007;
TULE WIND MUP 3300-09-019 & GP AMENDMENT 3800-11-001, LOG NO.09-0210002:
AS APPROVED BY THE BOULEVARD PLANNING GROUP ON DECEMBER 1, 2012:**

Submitted by Donna Tisdale, Chair: 619-766-4170 ; tisdale.donna@gmail.com

Item 5 E: County Revised Wind Energy Ordinance and Plan Amendment Draft EIR:

M/S Lawrence/McKernan: Approve draft resolution content (in opposition) with recommended changes; Allow Chair to add additional amendments, supplements, and member comments; incorporate by reference the comment letter submitted by Backcountry Against Dumps and The Protect Our Communities Foundation (on Wind Energy Ordinance & Plan Amend): Approved 6-0-0

Item 5C: Tule Wind Major Use Permit 3300 09-019, General Plan Amendment 3800 11-001, Log NO. 09-021-002:

M/S Hall/ Lawrence – Approve Chair to revise previous comments opposing Tule Wind MUP and GPA and to include additional comments, concerns, and items discussed. Oppose all revisions to our community plan. Go on record that turbines are not a civic use, they are commercial industrial energy projects. Specify definition small vs. large turbines. Passes 6-0-0

WHEREAS absentee landowners, commercial energy developers, San Diego Gas & Electric, and others have targeted the Boulevard / Jacumba area of East County for conversion from low-density rural / open space to an INDUSTRIAL ENERGY RURAL SACRIFICE / EXPORT ZONE AND EXPANDING TRANSMISSION CORRIDOR; and

WHEREAS industrial wind energy supporters appear to have enthusiastically adopted the same strategy of denial of adverse impacts that was used successfully for decades by the tobacco and other controversial industries: Deny; Deny; Deny; Discredit the Messenger;

WHEREAS the San Diego County Department of Planning and Land Use issued the November 2011 Wind Energy Ordinance & Plan Amendment DEIR¹ (PROPOSED PROJECT) that will serve to exacerbate the current feeding frenzy for energy project entitlements and unsustainable incentives; and

WHEREAS The Draft EIR for San Diego County's Wind Energy Ordinance & Plan Amendment POD 10-007 proposes to significantly reduce current setback requirements (and related protections) between industrial wind turbines, non-participating properties, and at-risk resources (including but not limited to homes, occupied structures, property, wildlife, recreation areas, and conserved lands), in order to facilitate and streamline the permitting process for unnecessary commercial industrial wind turbine projects that produce an expensive, intermittent, and unreliable² and potentially dangerous energy commodity, where no commercial or industrial zoning currently or lawfully exists; and

¹ Wind Energy Ord & Plan Amendment DEIR/POD10007: <http://www.sdcountry.ca.gov/dplu/ceqa/POD10007.html>

²

WHEREAS *in addition to other identified wind resource areas and proposed projects on BLM, Cleveland National Forest, State Lands Commission, and tribal lands located in San Diego County, the Proposed Project will effect approximately 807,984 acres (1,262 sq miles) of known wind resource areas³ under County jurisdiction⁴.*

WHEREAS *the Proposed Project is located in the fire-prone⁵ wind resource areas (with sensitive resources and recreation areas) in and around the rural communities of Boulevard, Jacumba, Pine Valley, Descanso, Campo, Potrero, Alpine, Ramona, Julian, Santa Ysabel, Warner Springs, Borrego Springs, and Ocotillo Wells⁶,*

WHEREAS *the identified Environmentally Superior Alternative Reduced Turbine Alternative still effects approximately 402,884 acres (630 sq miles) of fire-prone biologically and environmentally sensitive rural areas⁷ WITH DISPROPORTIONATE IMPACTS IN THE BOULEVARD AREA⁸, and many of the same impacts would remain significant and unavoidable⁹; and*

WHEREAS *the Boulevard community / Planning Area is by far the most adversely and disproportionately impacted by the Proposed and reduce project alternatives, followed by Jacumba,*

WHEREAS *"Environmental justice" is defined in California Government Code Section 65040.12 as "the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies."¹⁰*

WHEREAS *"The California Environmental Protection Agency (Cal/EPA) and our Boards, Departments, and Office (BDOs) shall accord the highest respect and value to every individual and community, by developing and conducting our public health and environmental protection programs, policies, and activities in a manner that promotes equity and affords fair treatment, accessibility, and protection for all Californians, regardless of race, age, culture, income, or geographic location".¹¹*

WHEREAS *Boulevard , Jacumba and related tribal communities do qualify under both CEQA and NEPA as Environmental Justice communities DESPITE denials, outright dismissal of such qualifications, and manipulation of data and area of impact, by project developers and promoters (including state and federal agencies); and*

WHEREAS *the Boulevard Planning Group has direct knowledge that residents and property owners, within the Boulevard Planning Area , and adjacent tribal communities, are already adversely impacted*

³ POD 1007: Figure 1-4

⁴ POD 1007:Page S.1-6

⁵ Fire Hazard Severity Zone maps: http://frap.cdf.ca.gov/webdata/maps/san_diego/fhsz_map.37.pdf

⁶ POD 10007: Page 1-33: Figure 1-4 Large Wind Project Area

⁷ POD 10007: Page S.1-7

⁸ See attached cumulative renewable energy projects map

⁹ POD 1007: Page S.1-7

¹⁰

¹¹ CalEPA Environmental Justice Home: <http://www.calepa.ca.gov/envjustice/>

by the existing 25 Gamesa 2 MW wind turbines located on lands leased from the Campo Kumeyaay Nation, and transmission / transformation infrastructure owned and operated by SDG&E and others, including numerous suspicious cancer cases; and

WHEREAS said DEIR has identified numerous unresolved AREAS OF CONTROVERSY and would allow for the Board of Supervisors to prepare a statement of overriding considerations *regardless of the number of significant effects on the environment, impacted residents¹², cultural, biological,¹³ and visual resources*; and

WHEREAS the DEIR has identified 24 areas where the proposed project effects STILL REMAIN SIGNIFICANT AND UNAVOIDABLE AFTER MITIGATION; and

WHEREAS the Areas of Known Controversy include the following: Development of wind turbines and MET facilities that could affect scenic vistas, visual resources, agricultural lands, special status species , and wildland fires¹⁴; and

WHEREAS said DEIR proposes to both establish and arbitrarily allow a waiver of low frequency C-weighted sound limits *if that limit would adversely impact the economic feasibility of a wind turbine project objectives*--thereby placing corporate income over and above the disproportionate adverse socioeconomic impacts and the County's mandate to protect the health, safety, and welfare of impacted residents and resources; and

WHEREAS we are of the strong opinion that the proposed project represents additional significant and cumulative adverse impacts that were not properly identified, recognized, or analyzed in said DEIR, including air and ground borne Low Frequency Noise / Infrasound and vibrations¹⁵, EMF, ELF, and /or Radio Frequency / Microwave radiation, produced by wind turbines and related infrastructure, some of which have been recorded up to 6.8 miles¹⁶ from operating wind turbine facilities; and

WHEREAS new information AND science-based peer-reviewed is now readily available that links significant adverse health^{17, 18} and safety impacts to humans^{19, 20}, wildlife²¹, pets, and livestock that are

¹² British Medical Journal: *BMJ* 2012;344:e1527: *Wind turbine noise seems to affect health adversely and an independent review of evidence is needed* : <http://betterplan.squarespace.com/todays-special/2012/3/10/31012-british-medical-journal-wind-turbine-noise.html>

¹³ USWFS: Effects of noise on wildlife: www.fws.gov/windenergy/docs/Noise.pdf ; <http://www.wind-watch.org/news/2012/04/01/federal-government-to-issue-take-permits-for-eagle-kills-by-wind-energy-companies/>

¹⁴ POD 1007: Page S1-4

¹⁵ The Society for Wind Vigilance's report with 67 citations: Low Frequency Noise Infrasound and Wind Turbines: <http://www.windvigilance.com/about-adverse-health-effects/low-frequency-noise-infrasound-and-wind-turbines>

¹⁶ Seismic Noise by Wind Farms: A case study from the Virgo Gravitational Wave Observatory, Italy: <http://www.bssaonline.org/content/101/2/568>

¹⁷ Society for Wind Vigilance issues a Global Guideline for the Minimum Siting Distance of Industrial Wind Turbines: <http://www.windvigilance.com/news>

¹⁸ Society for Wind Vigilance: Visual Health Effects and Wind turbines (with 27 citations): <http://www.windvigilance.com/about-adverse-health-effects/visual-health-effects-and-wind-turbines>

exposed to the low frequency noise, vibrations, electrical and light pollution emissions generated by industrial wind turbines, with symptoms reported up to 10 km²² (6.21 miles) ; and

WHEREAS industrial wind turbines and related infrastructure projects have been identified as significant and having unmitigable Class I effects related to FIRE & FUELS²³ and historic firestorms have proven devastating to both human and natural communities and habitats of San Diego County²⁴; and

WHEREAS the San Diego Smart Energy 2020 Plan identifies more than sufficient distributed renewable energy capacity at or near the point of use without reducing critical protections for at-risk resources in order to facilitate and streamline industrial wind turbine projects, as proposed in said DEIR; and

WHEREAS the Independent Science Advisors Report on the Desert Renewable Energy Conservation Plan (for biological resources only) including San Diego County wind resource areas, contains the following quotes: *"We also strongly advocate using "no regrets" strategies in the near term...the study area also includes non-desert mountain slopes and watersheds that support significantly different ecological communities , species, and processes than do the deserts...Our treatment of such areas in this report is unfortunately more cursory than that of the desert regions. We therefore strongly recommend that DRECP obtain additional scientific input concerning the non-desert portions of the planning area, including those associated with oak woodlands, grasslands, sage scrub, pinyon-juniper, and other vegetation communities found on mountain slopes."*²⁵

WHEREAS the Las Californias Bi-National Conservation Initiative (LCBI)²⁶ has already identified areas, including Eastern San Diego County, that will be impacted by the Proposed Project, as one of five globally significant biological hotspots of biodiversity, encompassing what conservationists refer to as "Mediterranean Mosaic" where weather and geography combine to create a dense intermingling of diverse habitats and over 400 at-risk and endangered species. Significant and rare Mediterranean Mosaic habitat, migration corridors / linkages²⁷, and critical wildlife species²⁸, that should be conserved and protected; and

¹⁹ Waubra Foundation: Explicit Cautionary Notice to those responsible for wind turbine siting decisions :

<http://media.crikey.com.au/wp-content/uploads/2011/07/caution.pdf>

EPAW-NAPAW Health Warning to Governments: The wind turbine syndrome has become pandemic:

<http://www.epaw.org/media.php?lang=en&article=pr5>;

Wind Turbines & Public Health (7:12 minute video):

<http://www.youtube.com/watch?v=IEh3sooKU8A&context=C4564e1fADvjVQa1PpcFNfrPRz6RWhumOwa3diFqMkr8CQDIKMAY=>

²⁰ <http://betterplan.squarespace.com/2012-wind-turbine-noise-health/>

²¹ Vulture v wind turbine video: <http://www.youtube.com/watch?v=8NAAzBArYdw&feature=related>

²³ Page ES 25: http://www.cpuc.ca.gov/environment/info/dudek/ECOSUB/Draft_EIR/00c-ExcutiveSummary.pdf

²⁴ CBI: The role of fire severity, distance from fire perimeter and vegetation on post-fire recovery of small-mammal communities in chaparral: <http://www.consbio.org/products/publications/the-role-of-fire-severity-distance-from-fire-perimeter-and-vegetation-on-post-fire-recovery-of-small-mammal-communities->

²⁵ Page 3: http://static.consbio.org/media/reports/files/SA_Desert_Renewables.pdf

²⁶ <http://consbio.org/products/projects/56> ; <http://consbio.org/products/reports/26> ;

²⁷ <http://www.scwildlands.org/projects/missinglinkages/linkagetour.aspx> ;

WHEREAS "The biodiversity of Mediterranean-climate ecosystems is among the highest of any biome in the world...Considering the sensitivity of plant species to repeated burning and the global conservation significance of Mediterranean-climate ecosystems, conservation planning needs to consider the human influence on fire frequency"²⁹

WHEREAS the Proposed Project area lies within the Pacific Flyway for avian migration³⁰

WHEREAS industrial wind turbines have proven to be detrimental to avian and bat species through collisions with wind towers and blades with tip speeds close to 200 mph, project power lines, and substations; and

WHEREAS starting in or around 2004, the Boulevard Planning Group has gone on record numerous times as opposing industrial scale wind turbine projects in or around the McCain Valley National Cooperative Land and Wildlife Management / Recreation Area and Airport Mesa/Table Mountain, Tecate Divide, and other wind resource areas, based on significant adverse impacts to public health and safety including increased risk of fire and impediment to fire fighting, property values, biological, cultural, recreational, visual, and other at-risk resources; and

WHEREAS we find that the proposed project is not in the best interest of San Diego County's human and natural communities and at-risk resources;

THEREFORE BE IT RESOLVED THAT the Boulevard Planning Group opposes the Proposed Project and reduced project alternatives and supports the No Project Alternative; and

IT IS FURTHER RESOLVED THAT in order to protect, defend, and /or to provide relieve for adversely impacted people, wildlife, pets, and livestock, that may be exposed to short and or long-term emissions and related suffering from the installation and operation of industrial wind turbine facilities and / or related infrastructure, the Boulevard Planning Group strongly urges the San Diego County Planning Commission and Board of Supervisors to:

- 1) **Deny** the Revised Wind Energy Ordinance & Plan Amendment DEIR
- 2) **Deny** any proposed resolutions in support of the Proposed Project, reduced project alternative
- 3) **Deny** any Statements of Overriding Considerations
- 4) **Deny** the proposed changes (AT PAGE 15) Amending Section 7359 FINDINGS REQUIRED FOR PARTICULAR USE PERMITS for Large Wind Turbines, removing protections for impacted communities, represents an unconscionable and unsupportable double standard for communities and resources that will located in newly designated Wind Resource Area located and those that are not

²⁸ East County MSCP biology: http://www.sdcountry.ca.gov/dplu/mscp/ec_biology.html ; EC MSCP List of species: http://www.sdcountry.ca.gov/dplu/mscp/ec_species.html

²⁹ <http://static.consio.org/media/publications/files/conservationthreatsduetohuman.pdf>

³⁰ Pacific Flyway Map: http://www.pacificflyway.gov/Documents/Pacific_map.pdf

5)Deny the allowance of any noise requirement waivers, such as the newly proposed c-weighting requirement to address potentially harmful and debilitating impacts from low-frequency noise / vibrations.

6)Introduce a moratorium on wind turbine projects

7)Initiate independent comprehensive peer-reviewed science based, multi-disciplinary full spectrum health and field studies on large scale industrial wind turbine generated noise, vibrations, electrical, and light pollution emissions--*without influence or funding from the wind industry or their representatives/ vested interests*--in order to determine and establish what, if any, dose-response related setbacks are truly protective of public health, safety, and welfare.

###

Robert & Kathryn Mc Callister
3032 McCain Valley Road
Boulevard, CA 91905

San Diego County Planning Commission
Overland Avenue
San Diego, CA 92123
via: Cheryl.Jones@sdcounty.ca.gov

October 1, 2012 5510

RE: Oct 5 hearing: Wind Energy Zoning Ordinance Amendments – Review of Board of Supervisors Amendments POD-1007; Opposition to industrial wind turbines allowed on private land too close to our home and others.

Dear Chairman Pallenger and Commissioners Day, Becks, Brooks, Norby, Reiss and Woods,

Please reject the changes approved by the Board of Supervisors on August 8th, allowing the installation and operation of industrial wind turbines on private Rough Acres Ranch land located on McCain Valley Road, less than 1 mile from our home of over 40 years, and changing the underground transmission line to an overhead transmission line in our fire-prone neighborhood. These projects represent increased risk of catastrophic wildfires and threats to public health and safety for residents and visitors to the McCain Valley Recreation Area.

We are both in our 80's and want to register our major concerns and strong objections to the location of any industrial wind turbines so close to our home on McCain Valley Road and others located on Ribbonwood Road to the west of us. We have enough trouble staying healthy without dealing with the adverse turbine generated noise and shadow flicker impacts and electrical pollution that has made other homeowners ill and driven some to abandon their properties.

McCain Valley Road is our only way into and out of our property and home. We now have the Sunrise Powerlink located here with the Tule Wind project and numerous other wind, solar, and related transmission projects planned here. For the record, we have attached our more in-depth Tule Wind opposition letter dated, February 12, 2011.

We also want to inform you that we believe we were misled by Mr. John Gibson of Hamann Companies and Rough Acres Ranch regarding the need for a utility easement through our private property to their parcels to the north of us, under the pretense that the easement was needed to provide electricity for several new homes they planned to build there, adjacent to McCain Valley Road and Lark Canyon OHV Park

Later, we learned that instead of the private homes, the Tule Wind substation was proposed for the parcel abutting our land on the north, and wind turbines were planned on their other parcels.

Please help us live our remaining years in our own home without these unnecessary intrusions.

Sincerely,

Robert and Kathryn McCallister

Robert & Kathryn McCallister

cc: Supervisor Dianne Jacob, Donna Tisdale

**Robert & Kathryn Mc Callister
3032 McCain Valley Road
Boulevard, CA 91905**

February 12, 2011

Mr. Iain Fisher, CPUC
Mr. Greg Thomsen, BLM,
c/o Dudek
605 Third Street,
Encinitas, CA 92024

Draft EIR-EIS : Tule Wind, ECO Substation, Energia Sierra Juarez

Dear Mr. Fisher and Mr. Thomsen,

This letter is being provided to ensure that our concerns and strong opposition are documented in the record for these large wind turbine, substation, and power line projects that your agencies are reviewing. We may need to join in filing a future lawsuit for damages related to loss of property value, quality of life, the use and enjoyment of our property, and other potential adverse effects.

We are both in our 80's, are in good health, and live full time on the 80 acres we own located at 3032 McCain Valley Road, in Boulevard. Until recently, this was a beautiful and quiet place to live and to invite family and friends join us. All that has changed and we are now very concerned for our own future and that of our neighbors, pets, livestock and the local wildlife.

A moratorium on industrial wind turbine projects should be initiated by local state, and federal agencies, unless and until science-based peer reviewed health and safety tests are conducted to determine a safe setback distance. To date, those studies have not been done and industrial wind energy supporters cannot claim otherwise.

You are now reviewing three energy projects, along with the additional proposed wind turbine projects on the Manzanita and Campo Reservations and Greg Lansing's ranch lands on Ribbonwood Road and Jewel Valley Road. San Diego Gas & Electric's large 500 kV Sunrise Powerlink towers and lines will also be installed all along the eastern edge of McCain Valley Road and our eastern property boundary about 1,000 feet or so from our home.

The Tule Wind turbines, that will stand almost 500 feet tall, are planned to be installed approximately 2,200 feet or some from our home along the top of the ridge just west of our property.

The new Tule Wind 138 kV transmission line is also planned to run right next to the Sunrise Powerlink lines along McCain Valley Road, our only access road. More Tule Wind turbines are also planned for private land on the ridgeline to the north east of our home. A new 5 acre substation and 5 acre operation and maintenance building,

for the Tule Wind project, are also planned for the open pasture on private property just to the north of us, or for the Rough Acres Ranch property just to the southwest of us.

There are several main concerns that we want your agencies to address and respond to:

- 1) Increased risk of fire; increased fire insurance rates or total loss of coverage due to new high risk development near our home; reduced fire fighting access due to increased potential for electrocution to fire fighters.
Power lines, turbines, substation transformers can all start fires. This can translate into a life or death situation for us, with only one access road and limited local fire fighting staff availability, equipment, and funding.
- 2) Noise and low frequency pollution from industrial wind turbines, some below the level of human hearing, can and does make people and animals ill when turbines are placed too close to homes, livestock, and sensitive wildlife areas. It has been reported that families have even abandoned their homes to escape the unbearable living conditions that are inflicted by these power generating turbine. Increased medical expenses and long-distance round trips for medical attention can really add up. Impacts to pets and livestock can also be severe and expensive.
- 3) 2,200 feet is way too close for turbines. We don't want them anywhere near our home or the homes of other families. They should be placed several miles away from any occupied buildings, livestock, public recreation areas, campgrounds, and protected wildlife areas.
- 4) Electrical pollution, stray voltage, has been documented in and around other wind turbine and substation projects and homes within 1,800 feet and much more. There are indications that wind turbines and the substations that serve them are more prone to generate electrical pollution due to the intermittent nature of the energy they produce.
- 4) Shadow flicker from turbines can extend several thousand feet during certain times of day and can create a harmful pulsing light effect that can result in vertigo, seizures, or other adverse effects. That strobe effect also has adverse effects on pets, livestock and wildlife. Our home and property will likely be impacted during the late afternoon and evening hours.
- 5) Property value losses are being recorded at other wind turbine projects. We join others in requesting that Tule Wind be required to enter into binding Property Value Protection Agreements to ensure that we do not suffer lost value or the inability to sell our property, if rendered necessary, due to the adverse impacts generated by the proximity of their massive wind turbines, power lines, and substations that will surround us.
- 6) We are requesting that any project approvals include binding contractual agreements for adequate and ongoing funding for third party unbiased pre-construction testing for ambient noise, low frequencies and infrasound, and dirty electricity levels to be taken both inside and outside our home and at all our property lines. We are also requesting ongoing monitoring and enforceable

compliance guarantees that include shutdown of non-compliant turbines--in the event these projects are approved over our objections.

7) The County noise ordinance and turbine setbacks are currently inadequate to protect public health and safety and cannot be relied upon for these projects. Compliance with those standards, as stated in the Draft EIR/EIS will NOT insure against the generation of a nuisance. Your agencies must address this issue. Our rural ambient noise levels are much lower than stated in the Draft EIR/EIS. Complaints have been generated at other wind energy projects with only minimal increases in noise levels. All ranges of noise levels, audible and inaudible need to be documented at pre-construction levels--and protected.

8) We also have concerns over adverse impacts to both the quality and quantity of our well water. Tule Wind will be clearing, grading, and blasting for turbine footings and new access roads. They will also be drawing large amounts of well water from several wells on Rough Acres Ranch for cement batch plants and other operational uses. Their turbines, substation, transformers, and maintenance buildings will contain hazardous fluids that can spill or leak into the water table. Our water levels should be documented by a licensed unbiased third party prior to commercial uses at nearby wells. We have no economically viable alternative source of water available to replace what we currently have.

9) Day time strobe lights and red blinking night lighting on the turbines and some of the transmission towers will create another nuisance both day and night, and take away from our beautiful dark night sky, one of the few left in Southern California.

In short, we strongly object to and oppose the introduction of any commercial industrial scale wind turbines, the related infrastructure, and all the adverse impacts that go with them, into our quiet rural neighborhood.

Any approvals of such would constitute a nuisance based on bulk and scale, blinking lights, noise levels (including low frequency and infrasonic), disruption to the peaceful use and enjoyment of our home and property and the very real potential for adverse health effects. While ignored, denied, and dismissed by the wind energy industry, growing evidence documents that some home owners have been bought out by wind energy companies due to undeniable adverse effects. The problems are real and must be addressed by your agencies prior to any project decisions.

Sincerely,

Bob McCallister
Kathryn M. Callister
Robert and Kathryn Mc Callister

cc: Donna Tisdale

BACKCOUNTRY AGAINST DUMPS

PO BOX 1275, BOULEVARD, CA 91905

THE PROTECT OUR COMMUNITIES FOUNDATION

PO BOX 305, SANTA YSABEL, CA 92070

DATE: 10-3-12

TO: San Diego County Planning Commission

FROM: Donna Tisdale, as an individual, as BAD President & POC Secretary; 619-766-4170;
tisdale.donna@gmail.com

RE: OCT 5TH PLANNING COMMISSION HEARING: WIND ENERGY ZONING ORDINANCE AMENDMENT –
REVIEW OF BOARD OF SUPERVISORS AMENDMENTS; POD 10-007

Dear Chairman Pallenger and Commissioners,

The Board of Supervisors' Tule Wind amendments, allowing massive towering electricity generating turbines within 131% of turbine height (now averaging 400-500 feet tall) from non-participating property lines; 131% of turbine height from public road right of ways; and 101% of turbine height from the edge of transmission line easements¹, are unnecessary, unconscionable, and seriously negligent.

We are requesting the following actions:

1. **Please reconfirm your previous justified and well reasoned vote** to deny the 5 Tule Wind turbines proposed for Rough Acres Ranch, and to require that the gen-tie line be placed underground instead of overhead.
2. **Please reject the Board's Tule Wind amendments** for dangerously reduced setbacks that were based in part on an alarming lack of valid information, overall, and on significant misrepresentations made by Iberdrola's Harley McDonald and others, regarding the proximity of homes (and campgrounds that are within 1 mile); their ability to prevent turbine fires and to keep them from spreading into catastrophic wildfires (despite at 2 Iberdrola turbine fires since May², including lightning strike fires); the extent of cumulatively significant adverse impacts to public health and safety, viewsheds³ and other resources; and reliance on the irresponsible and misleading HHS Public Health Position Statement, Human Health Effects of Wind Turbines (7-10-12), that ignores valid peer-reviewed documentation and inexplicably fails to address the very real and damaging *indirect effects* of turbines and related infrastructure, such as noise, low frequency noise, vibrations, and electrical pollution.

¹ Staff Report: Page 15 of Attachment B pdf: Resolution Approving POD 10-007: Strikeout /Underline

² May 22, 2012 Iberdrola's Barton Wind turbine fire:

http://nawindpower.com/e107_plugins/content/content.php?content.9883

August 6, 2012: Iberdrola's Buffalo Ridge Wind turbine fire:

http://www.brookingsregister.com/v2_news_articles.php?heading=0&story_id=15161&page=76

May 14, 2009: Iberdrola's Locust Ridge turbine fire: <http://www.windaction.org/news/21321>

³ Tule Wind Visual Impact Map Figure 2 at page 19:

http://www.dudek.com/ECOSUB/TuleAED/Appx_F_VisResources.pdf

3. **Request the Board to reconsider their Tule Wind amendments and address the new Tule Wind Notice of Availability⁴ for an additional 20 turbines on Ewiiapaayp tribal lands and 7 on State Lands Commission Lands** released by the Bureau of Indian Affairs on September 19th. The 62 turbines approved on BLM land plus the 27 additional turbines will equal 201 MW of capacity using 1.5 MW turbines. **Therefore, the 5 turbines proposed for Rough Acres Ranch land are not needed and would exceed Iberdrola's existing 201 MW CALISO grid connection agreement.**
4. **Request the Board to reconsider the Manzanita Tribal Chairman's request to delay any Tule Wind MUP decisions until after the completion of the formal Health Impact Assessment being conducted now for the Manzanita tribal members⁵**, who are being adversely impacted by the existing 25 Kumeyaay Wind turbines and will be exposed to cumulative impacts from the Tule Wind turbines. **Recommend a not-to-exceed turbine height limit** and larger setbacks for all large-scale turbines and especially for turbines 3 MW and larger that can generate more energy along with more noise and electrical emissions / pollution.
5. **Ask County Counsel to answer this question: "Does the County have jurisdiction / enforcement authority over private in holdings surrounded by and accessed solely through federal land?"**
The Rough Acres Ranch turbines are proposed for private in holdings. Previously, the County had stated they could not enforce groundwater regulations on private in holdings located within the Campo Reservation. Does the same apply in this case? If so, the County should not be approving project components that they have no enforcement authority over.

Contrary to Iberdrola's false claims, an octogenarian couple lives within 1 mile of Tule Wind Rough Acres Ranch turbines, and additional private in holdings, with dwellings, are also located on McCain Valley Road north of Lark Canyon OHV Park and campground:

- **Contrary to the misrepresentations made to the Supervisors, the long-term home of octogenarians, Robert and Kathryn McCallister, is located less than one mile from the turbines authorized by the Supervisors.**
- Their home, at 3032 McCain Valley Road, sits between two private parcels included in the Tule Wind project under the Rough Acres Ranch name, adjacent to turbines identified as R-11 and R-12 in Figure 2 in the ⁶BLM's Record of Decision.
- The McCallister's comment letter, dated October 1, 2012, is incorporated by reference along with their previous comments and those submitted by myself, the Boulevard Planning Group, BAD, POC and Volker Law Offices.
- Another octogenarian couple, Joe and Iris Mauris, lives to the west of the Tule Wind turbines, again within less than one mile.
- These retired senior couples are already dealing with limited income and significant health issues and have expressed their opposition to Tule Wind and other proposed projects and the increased levels of stress, nuisance, and hardship that these projects represent.

Recent Boulevard wildfires and firefighter concerns with adding additional fire ignition sources:

⁴ <http://www.biawind.com/wp-content/uploads/2012/09/NOA.pdf>

⁵ Manzanita Tribal Chairman's letter to Planning 'Commissioners', dated June 6, 2012

⁶ Tule Wind BLM ROD Figure 2:

http://www.blm.gov/pgdata/etc/medialib/blm/ca/pdf/elcentro/nepa/tule.Par.91417.File.dat/Tule_Wind_ROD_Fin_al_121911.pdf

- The September 23rd 2,555 acre Shockey Fire⁷ and June 17th 995 acre Old Fire⁸, both in the Boulevard Planning Area, were incredibly fast moving fires that raced through our dry chaparral—showing little mercy to man or nature.
- One life and 11 homes were lost along with many other structures, centuries old oak trees, chamise-red shank chaparral, and wildlife.
- Veteran fire fighters and local law enforcement officers expressed surprise at the speed of both of these recent fires—without the presence Santa Ana winds.
- Coverage from Channel 10 News includes several clips of my personal home video taken as the Shockey Fire consumed about 250 acres of my own family's 310 acres⁹. In a matter of minutes, about 30 acres of old growth chaparral was incinerated in a horrific display.
- Later, when I personally spoke to a wide variety of senior fire fighters defending the Tierra Del Sol neighborhood (during the Shockey Fire) about the planned location of hundreds of additional turbines, large-scale solar projects, and related electrical infrastructure, in the Tierra Del Sol, Boulevard, and Jacumba area, they all expressed serious concerns with installing *any* additional high profile and dense fire ignition sources that will increase fire risk and impede fire fighting abilities.
- **Not one fire fighter expressed support for these types of industrial wind, solar, transmission projects being located in our fire-prone rural area,** some had actually responded to turbine fires elsewhere and had nothing good to say about them.

Visual impacts misrepresented to Board by Iberdrola:

- *Iberdrola's Harley McDonald made false statements during the August 8th Board hearing claiming that they had a hard time finding anywhere in Boulevard where their Tule Wind turbines would be visible!*
- However, Iberdrola's own Tule Wind Visual Impact Map (HDR 2010)¹⁰ shows the high degree of Tule Wind turbine visibility throughout the Boulevard Planning Area, and from Carrizo Gorge Wilderness Area, Sawtooth Mountain Wilderness Area, Sombrero Peak Wilderness Area, and In-Ko-Pah Mountain Area of Critical Environmental Concern.
- And that map does not even include other elevated Boulevard residential areas, south of I-8, that will also be visually impacted by the presence of Tule Wind turbines, such as Tierra Del Sol Road, Jewel Valley Court, Shasta Way,

Turbines and cumulative impact projects located too close to homes, public recreation areas, sole access public roads, sensitive resources, and In-Ko-Pah Mtn ACEC:

- *Once again, we are raising alarms and strong objections to the County's double standards for industrial wind turbine projects, changed Findings for turbines,* and the authorization of large wind turbines and related infrastructure projects within our scenic and vastly underserved High and Very High Fire Severity Zones less than one mile from occupied homes, public recreation

⁷ Shockey Fire incident report: http://cdfdata.fire.ca.gov/incidents/incidents_details_info?incident_id=754

⁸ Old Fire incident report: http://cdfdata.fire.ca.gov/incidents/incidents_details_info?incident_id=640

⁹ <http://www.10news.com/news/some-residents-stay-put-despite-orders-to-evacuate-due-to-shockey-fire>

¹⁰ Tule Wind Visual Impact Map Figure 2 at page 19:
http://www.dudek.com/ECOSUB/TuleAED/Appx_F_VisResources.pdf

areas, campgrounds and roads, sensitive cultural, biological, and other resources on private Rough Acres Ranch land abutting the In-ko-Pah Mountains Area of Critical Environmental Concern and occupied Bighorn Sheep and Golden Eagle habitat.

- There is only one public road in and out of the McCain Valley Conservation and Recreation area that will now be lined by the Sunrise Powerlink, Tule Wind turbines on both sides of the road, and the Tule Wind over head gen-tie line and 3,588 tracking Soitec Solar modules and additional gen-tie line for the proposed 80 MW Rugged Solar LLC project on Rough Acres Ranch land—also located on both sides of McCain Valley Road.

Conclusion:

Please help us convince the Board to reconsider their Tule Wind amendments, reject their changes, and help direct the County to find better, less destructive, point-of-use alternatives that also reduce unnecessary liabilities for the County.

Thank you...

Jack White
Campo Lake Morena Planning Group
29445 Yaweh Lane
Campo, Ca 91906

Matthew Schneider
Department of Planning and Land Use
County of San Diego
5201 Ruffin Road, Suite B
San Diego, CA 92123
matthew.schneider@sdcounty.ca.gov

May 10, 2012

Comments on Wind Energy Zoning Amendment and General Plan Amendment to the Mountain Empire Subregional Plan (Boulevard) POD 10-007

Mr. Schneider,

The Campo Lake Morena Planning Group would like to address the new Wind Energy Zoning Amendment and General Plan Amendment to the Mountain Empire Subregional Plan.

Small Wind Turbine:

1. **Setback**-Setback from homes should be at least that of the buffer for golden eagles, especially when considering neighboring properties.
3. **Golden Eagle Nest Buffer**-Wind turbines should not be allowed near eagle nests. Even if the functioning wind turbine does not impact Golden Eagle nests, the construction of said wind turbines could greatly impact these nest. If nothing else, construction should be limited to seasons when the Eagles are not nesting.
4. **Area of Disturbance**-The area of disturbance after construction is addressed. However, the area of disturbance during construction was not addressed.
5. **Barriers**-In our rural community with the unique issues involved with trespassing and international travelers, it was unclear how the county plans to keep people away from these turbines.
6. **Noise**-We believe the same c-weighted sound requirements used for large turbines should also be used for small turbines, especially with the ability to place 3 or more turbines on an individuals property. This can negatively impact neighboring homes.
7. **Height**-The height of small turbines should be limited not by the power generated, but by the visual impact to neighboring homes. The height should be closer to the height of trees and homes in the area. This would be closer to 35 feet for an individual wind turbine.
8. **Lighting**-Small individual wind turbines should not be lit. We understand due to air traffic it is sometimes necessary to light taller turbines. However, small turbines should not be tall enough to impact air traffic. Our back country is reliant on our night skies and

a lit wind turbine does not match our community character.

9. Historic Resources-The historic resources section is sound. Please take into consideration the historic significance of our back country communities and the importance of our scenic vistas along our historic routes of Highway 94 and Highway 80.

14. Military Operating Area-Our backcountry community is located next to the Mexican Border. Due to this, there is a large presence of border patrol in our backcountry community. These agents rely on not only radio communication between land vehicles, but also among air traffic. Please take into consideration not only the impacts on military, but also the impacts on our border protection in the placement of wind towers. El Paso Texas has put a stop to wind turbine construction due to the interference with emergency radio communications.

In addition, our rural communities rely on emergency radio communication during emergency situations (ie. Wildfires) in which we lose power. Please take into consideration the impacts on radio communications during emergency situations for our emergency workers, but also the community and its volunteers.

Also, due to the distance from hospitals it is often necessary to transport individuals through life flight helicopters. We need to ensure wind turbines will not impact these radio communications.

17. Additional Turbines-Until health studies have been done, the amounts of turbines on a property should be limited to no more than three 40 foot small wind turbines.

Large Wind Turbine

1. Lot Size-On a minimum 5 acres parcel is there a limited number of towers?

2. Location-Alternative locations should be investigated. Our rural community relies on its scenic vistas, night skies, quiet, and rural character, all of which are impacted by the placement of large wind turbines. In addition, in our rocky mountainous back country communities wind tower noise has been proven to travel further than in other areas.

3. Setbacks-Recent studies have shown set back should be at least 2 miles from homes due to health impacts on people. Until it is scientifically proven otherwise, this should be a serious consideration in protecting the residents in the back country.

4. Setback reductions-These should not be allowed.

5. Barriers-As stated in regards to the small turbines: In our rural community with the unique issues involved with trespassing and international travelers, it was unclear how the county plans to keep people away from these turbines.

7. Noise-Please refer to studies done by Professor Henrik Moller a world-leading specialist in low-frequency sound, Dr. Sarah Laurie of the Waubra Foundation, or epidemiologist Dr. Samuel Milham's study of our own back country. These are three different studies regarding noise produced by wind turbines and their impact on people and wildlife. In addition, sound readings should be done inside homes, where people notice the most impacts. Also, what is the process after wind turbines have been built and the sound is above the regulated amount? How are studies done before the building of wind turbines and their possible impacts on the neighboring home owners?

8. Post-construction sound monitoring-Sound monitoring should be done sooner than one year. It should be done within 3 months and every three months within the first year. This is especially important with the concerns over negative health impacts on residents. This will also get readings at different times of year when the sound can be different.

After the initial reading, monitoring should be done annually and when new health concerns or complaints have been filed. These monitors should also be done during different times of year.

Noise

Sound studies should be done inside neighboring houses in addition to property lines. It is stated that greater than 20 dB can create a disturbance. We believe the county should be conservative and make the variance 10 dB. This allows for error and helps to protect community residents.

General Plan Amendment

1. The communities of Boulevard and Borrego Springs took time and energy creating community plans which fit their community vision and character. In these plans they both specifically mentioned wind turbines and their wishes as people living in these communities. Please listen to their wishes as they are the ones who live there. Do not change community plans if the communities did not ask to have them revisited.

Small Turbines

Restricting towers to previously developed land is an important requirement. The possible height of small wind turbines is too high. Small wind turbines should be consistent with current construction in the community so they match the current community character which is so important in our rural communities.

Public Input

1. **Biology**-A biological study needs to be required. The backcountry has numerous endangered species and is an international wildlife corridor. Small turbines under 30 feet should not need a biological study. However, larger turbines which can seriously impact the wildlife migration patterns and habitats needs to be studied.

2. **Noise**-A setback reduction should not be allowed through obtaining permission from neighbors. This can impact the neighbor's neighbors who did not have a say in the setback reduction but which may have otherwise not been impacted.

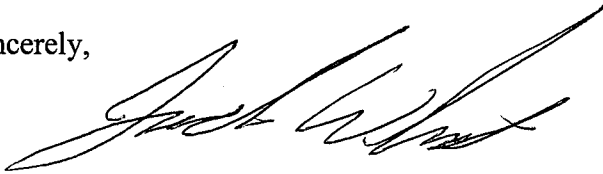
3. **Health**-It is stated there is not any published scientific evidence to conclude wind turbine noise could result in health impacts. If this is true, then before any decisions are made which may impact people's lives, the county should either wait for a scientific study or conduct one themselves. To ignore the complaints and concerns which have originated all over the world would be gross negligence on the part of the County of San Diego. We have come across a plethora of documents regarding studies and adverse health affects. Among the professional who have published letters, books, and other documents are world renowned and respected epidemiologists, physicians, professors and other health care professionals. The list includes, but is not limited to, Dr. Nina Pierpont, Dr. Amanda Harry, Dr. David Iser, Dr. Christopher Hanning, Dr. Michael Nissenbaum, Professor Henrik Moller, Professor Mariana Alves, and Professor Robert McMurtry. These professionals have published concerns in England, Denmark, Portugal, Australia, Canada and the United States to name a few. There are too many repeated universal complaints to believe there are not health concerns in regards to large wind turbines.

4. Safety-Large wind turbines are a major safety concern in our back country. According to authorities in El Paso, Texas, they cause interference with emergency systems. This would seriously impact our back country communities which rely on emergency communications during emergency situations. In addition, we have regular flights by military, border patrol, and life flight helicopter services. Any concerns over interference with these flights should be addressed.

There is also no way to make it fire safe without clearing a large area around the wind turbines. However, this would seriously destroy our sensitive habitat. Also, when fighting a burning wind turbine, engines will be unable to fight from the ground. This would require air support and facilities to fill the air support needed. Additional water towers should be required at wind turbine locations.

In conclusion, our small rural communities rely on our community character to bring tourism to our communities. Introducing large wind turbines destroys this community character. Please review not only the impacts of wind turbines on our community character, but also the possible health impacts. If an accepted scientific study has not been done, then one needs to be done before any additional wind turbines are built which may negatively impact people's lives.

Sincerely,



Jack White
Campo Lake Morena Planning Group Chair

c.c. Planning Commissioners

Michael Beck (representing District 2, Supv. Dianne Jacob)

Leon Brooks (representing District 4, Supv. Ron Roberts)

Adam Day (Vice-Chairman, representing District 5, Supv. Bill Horn)

Peder Norby (representing District 3, Supv. Pam Slater-Price)

David Pallinger (Chairman, representing District 5, Supv. Bill Horn)

John Riess (representing District 1, Supv. Greg Cox)

Bryan Woods (representing District 2, Supv. Dianne Jacob)

Correspondence Attn: Cheryl Jones County of San Diego

Lael Montgomery
13678 McNally Road
Valley Center, CA 92082
760-751-0300 ~ laelmontgomery@aol.com

LATE SUBMITTAL

APR 13 2012

#3
Received by the
San Diego County
Planning Commission

April 10, 2012

TO: San Diego County Planning Commissioners
Michael Beck, Leon Brooks, Adam Day, Peder Norby, David Pallinger, John
Reiss, and Brian Woods

RE: Design Guidelines for Residential Projects

These Design Guidelines were intended to implement the Conservation Subdivision Program by illustrating the approaches to site design and project planning that characterize and distinguish this new entity. Even though I think DPLU staffers have done an excellent job presenting the array of site design and planning approaches which in aggregate produce the "conservation subdivision", I have serious concerns about the way these design guidelines are now positioned in the overall implementation scheme.

The idea behind creating **Design Guidelines for Conservation Subdivisions** was to provide a common understanding about the design approaches that characterize a conservation subdivision for applicants, consultants, County planners, community advisory groups, Planning Commissioners and Supervisors. Clarity early in the process about the design of this new entity would produce better projects and quicken processing. As we all know, the use regulations that govern development in the County are not form-based and are inadequate to produce the particular mix of design approaches that constitute a "conservation subdivision. Use regulations do not address overall form or how to create it.

It is a mistake to position guidelines that are required to define a conservation subdivision as voluntary design guidelines for all residential subdivisions. I understand the political mood right now is to eliminate regulation and that positioning these guidelines as "voluntary" for all residential subdivisions fits into this mood. But this murky posture undermines both the original goal AND adds another layer of "suggestion" that will, if anything, delay conventional subdivision processing.

Worse, to position as voluntary the very design approaches that constitute a Conservation Subdivision defeats the Conservation Subdivision program before it starts. The failure to make clear that these are the design approaches that create a Conservation Subdivision confuses rather than clarifies and will result in approvals for any site design that can be justified by the use regulations.

My suggestions are:

1. The title should be **"Design Guidelines for Conservation Subdivisions."**
2. The introduction should state clearly that these design approaches are required in order for a subdivision to be considered a "conservation subdivision".
3. The introduction should also state that many of the design treatments are also appropriate and desirable for conventional subdivisions. The manual should also explain the concept of "context sensitive" design. It would be very helpful to remind readers that the General Plan is organized by Village, Semi-Rural and Rural contexts, and that these areas should be designed differently. A "good design" for one context will likely be a poor design for another.

The premise of context sensitivity is that site design, lot design, street design and myriad details should vary according by context. The manual should point out elements of the whole design that create character and make the significant difference: road design, lot sizes and shape, setbacks, landscape forms and so forth.

4. Graphics.

The document needs more graphics that show what we are trying to get. More streets should be curvy, not straight lines. (Linear streets produce linear lots. Curvy streets enable less geometry.) More lots should be varied in shape and size. More streets should be single-loaded revealing peaks through the line of houses of the country-scape. More examples of the diversity we are aiming for.

5. Citations

It would help to include citations to works that focus particularly on the design of Conservation Subdivisions.

Thank you for the opportunity to contribute.

Sincerely,



Lael Montgomery
Chair, Valley Center Design Review Board

Valley Center Design Review Board

December 11, 2012

San Diego County Board of Supervisors
1600 Pacific Highway
San Diego, CA 92010

RE: WIND ENERGY ORDINANCE AND PLAN AMENDMENT POD10-007

Dear Chairman Roberts and Members of the Board,

At our regular meeting held on December 13, 2012, our board voted to submit these formal comments for inclusion in the record for the pending Board Hearing now expected to be held in January.

The Valley Center Design Review Board supports development that respects the County General Plan and Community Plans, which were approved barely more than a year ago. These "constitutions of land use" have been created through a lengthy and thorough public process to accommodate growth and change while at the same time protecting the character and essence of back country towns and honoring the rural qualities that residents so cherish.

While our board members support the endeavor to bring renewable energy generation to our area, we encourage our political leaders to seek proposals that achieve this objective without scattering industrial installations across the backcountry, many miles from where this energy is actually used.

We concur with and support the Boulevard Planning Group's well researched concerns, observations, and objections regarding problems generated by industrial wind turbines and the significant damaging changes proposed in the Wind Energy Ordinance & Plan Amendment, including the following:

- The industrialization of rural San Diego County is unnecessary for renewable energy generation that can be done at, or close to, the point of use which also helps reduce the need for additional expensive new high-voltage power infrastructure and corridors.
- Precedent setting and harmful amendments to the Boulevard Community Plan, approved in late 2011, represent an unequal standard for industrial scale energy projects and communities.
- Changes to the Major Use Permit Findings represent additional unequal standards for industrial scale wind and solar projects related to compatibility with surrounding uses, bulk, scale, density and intensity of use, harmony with community character. These drastic and harmful changes would never be allowed in La Jolla or Rancho Santa Fe.

- Increased risk of catastrophic wildfires in underserved low-income fire-prone rural areas, designated as High and Very High Fire Severity Zones, through malfunctioning wind turbines, transformers, substations, utility lines, and lightning strikes that ignite highly flammable composite blades.
- Direct, indirect and cumulative adverse impacts to public health and safety ,quality of life related to turbine generated noise, audible and inaudible low-frequency noise, vibrations, and electrical pollution in the form of stray current / dirty power and increased ground currents that can migrate off-site and into homes and other occupied structures.
- Allowing for a Noise Waiver Area for low-frequency noise restrictions, regardless of conditions, represents yet another unconscionable double standard favoring for-profit wind turbine projects *over the County's mandate to protect public health and safety.*
- Loss of scenic integrity, tourism, and property values as documented by non-industry biased appraisers, with homes in some communities completely abandoned due to invisible pollution.

Therefore, we call on the Board to reject the flawed Wind Energy Ordinance, Plan Amendment, and reduced community protections and to focus instead on a county-wide plan for distributed point of use energy generation, energy efficiency and conservation, and micro grids like the one at UCSD that helped power San Diego during several major power outages.

Sincerely,



Lael Montgomery, Chair
 Robson Splane, Vice Chair and Secretary
 Jeffrey Herr
 Susan Moore
 Keith Robertson

cc:

San Diego County Board of Supervisors and their energy advisors
 Donna Tisdale, Chair, Boulevard Community Planning Group
 Matthew Schneider, DPDS

**JAMUL DULZURA
COMMUNITY PLANNING GROUP
P.O. Box 613
Jamul, California 91935**

December 14, 2012

San Diego County Board of Supervisors
1600 Pacific Highway
San Diego, CA 92101

Dear Chairman Ron Roberts and Members of the Board:

At our regular Jamul Dulzura Community Planning Group meeting held on December 11, 2012, we voted unanimously to support the Boulevard Planning Group's opposition to the proposed Wind Energy Ordinance and Plan Amendment (POD 10-007). We express the following concerns:

- It appears that the Boulevard Community Plan is being attacked and that approval of this ordinance would set a dangerous precedent.
- We have a concern regarding the waiving of any existing ordinance, including the noise ordinance, to the possible detriment of the community in order to benefit the economics of private interests.
- We urge that an independent scientific response study is needed to determine setbacks that would adequately protect the public health and safety. No action should be taken prior to the completion of those studies. In addition, we would urge a review of said studies by Planning Group representatives, in order for us to best communicate the results of the studies and obtain feedback within our communities.

Sincerely,



Michael Casinelli, Chair

Jamul Dulzura Community Planning Group



Manzanita Band of the Kumeyaay Nation

June 6, 2012

San Diego County
Department of Land Use and Planning
5201 Ruffin Road, Suite B
San Diego, CA 92123

Commissioners,

As the Chairman of the Manzanita of the Kumeyaay Nation, we respectfully request that you delay any decision regarding the proposed project entitled TULE WIND, which is under consideration for McCain Valley in the eastern part of our County, until we as a sovereign government conclude our current HEALTH IMPACT ASSESMENT (HIA) Study.

Our Manzanita citizens currently live in close proximity to a high voltage wind project operating adjacent to our residential reservation homelands.
We are experiencing an inordinate level of health challenges for our people.

In order to determine the nature of our health issues Manzanita has engaged in an academically valid research based study conducted by the NATIONAL LATINO RESEARCH CENTER, which is under the umbrella of CALIFORNIA STATE UNIVERSITY, SAN MARCOS.

Through professional survey, screening, interviews, and medical record assessment our Health Impact Assessment study will isolate the various environmental factors that contribute to our adverse health issues, characterize health impacts, evaluate results compared to available standards and thresholds, distinguish inequitable impacts, consider cumulative the effects, forecast health effects, provide an economic valuation of negative impacts, and present recommendations for mitigation and alternatives.

Our people are an ideal subject group for this type of study since we have resided in our current location for decades. This spans many years prior to the wind farm operation and the several years since commercial operation. Additionally, our medical records are centrally located with the Southern California Indian Health Clinic. Thus, our HIA will be the best available information to determine the actual health risks associated with living next to high voltage wind turbines, transmission lines, and infrastructure.

This comprehensive Manzanita-CSUSM health study will take approximately four to six months to complete. Any prior approval of the Tule Wind project will be placing our residents in an unreasonable and increased foreseeable health risk.

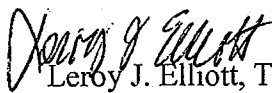
Although the application before your Commission by Tule is limited to transmission lines and a half dozen wind turbines, an approval by your Commission will provide the necessary avenue for the applicant to install wind turbines that will entrap Manzanita on our north and east borders. This combined with the existing commercially operational project along our southern border will create a cumulative effect that most likely tenders our residential reservation land uninhabitable. We have been on these lands for thousands of years and we the Kumeyaay are the original stewards of San Diego County.

We are asking you to allow our Health Impact Assessment Study to be completed prior to making any decision of the suitability of wind projects proposed to be developed in close proximity to residential housing. This will allow your Commission to have the most valid and current information to make a responsible decision on the ultimate fate of not only this, the Tule Wind project, but more importantly the health of our Manzanita elders, children, and families.

A short delay in making your decision weighted against the potential devastating impacts that may well produce real and lasting human suffering, result in loss of our quality of life, and even reduce the life span of our citizens is a small thing to ask given what is at stake.

We look forward to you doing the responsible thing by delaying any decision until the medical research is available in just a few months.

Respectfully,



Leroy J. Elliott, Tribal Chairman
The Manzanita Band of the Kumeyaay Nation

VIEJAS[®]

OFFICE OF LEGAL AFFAIRS

P.O. Box 280
Alpine, CA 91903
5000 Willows Road
Alpine, CA 91901

LATE SUBMITTAL
Phone: 619.659.1970
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APR 13 2012

received by the
San Diego County
Planning Commission

April 12, 2012

David Pallinger, Chairman
San Diego Planning Commission
520 Ruffin Road, Suite B
San Diego, CA 92123

c/o Cheryl.Jones@sdcounty.gov

Re: April 13, 2012, Planning Commission, Item 5
Wind Energy Ordinance Amendment, POD 10-007, Countywide

Dear Chairman Pallinger and Fellow Commissioners:

On March 5, 2012, the County and Viejas began its consultation under SB 18 for the proposed County Wind Energy Ordinance. Many items were discussed at that meeting, and several action items were assigned, including those listed in the attached email from County Staff to Viejas. We also note that the Staff Report states that SB consultation with Viejas is ongoing (page 5-12).

Viejas takes SB 18 consultation, and its government-to-government relationship with the County, very seriously. We were surprised to see the project on the Planning Commission's agenda for the April 13, 2012, meeting without having the action items completed. County initiation of the SB process at an earlier point in time (prior to the DEIR going out for public review, for example) might have resulted in the consultation being further along.

Viejas agrees that the SB 18 consultation on this item is incomplete. We therefore respectfully request that the Commission continue this item, to allow Viejas and the County the opportunity to try to complete their dialogue before elevating the project to the Board level. In the alternate, if the Commission were to take action at the hearing, we request that any recommendation be made with the express caveat that SB 18 consultation between the County and Viejas will be completed prior to final decision making.

David Pallinger

April 12, 2012

Page Two

Thank you for your consideration.

Sincerely yours,

Deane Grubbs-Duval
on behalf of Kimberly R. Mettler

Kimberly R. Mettler, Director

Viejas Office of Legal Affairs

Viejas Band of Kumeyaay Indians

Attachment

cc: Hon. Dianne Jacob
Matthew Schneider
Donna Beddow
Courtney Ann Coyle, Esq.

Denise Strobebridge-Elwell

From: Kimberly Mettler
Sent: Friday, April 13, 2012 8:36 AM
To: Denise Strobebridge-Elwell
Subject: Fwd: SB 18 Consultation - Wind Energy Ordinance Amendment
Attachments: Agenda.pdf; Project Summary.pdf; Meeting Sign-in .pdf

Begin forwarded message:

From: "Schneider, Matthew" <Matthew.Schneider@sdcountry.ca.gov>
Date: March 6, 2012 2:31:49 PM PST
To: Kimberly Mettler <KMettler@VIEJAS.com>, "CourtCoyle@aol.com" <CourtCoyle@aol.com>
Cc: "Fogg, Mindy" <Mindy.Fogg@sdcountry.ca.gov>, "Farace, Joseph" <Joseph.Farace@sdcountry.ca.gov>, "Beddow, Donna" <Donna.Beddow@sdcountry.ca.gov>, "Wright, Gail" <Gail.Wright@sdcountry.ca.gov>, "Mead, Mark C" <Mark.Mead@sdcountry.ca.gov>, "Switzer, Dixie" <Dixie.Switzer@sdcountry.ca.gov>
Subject: SB 18 Consultation - Wind Energy Ordinance Amendment

Courtney & Kim -- We appreciate you meeting with us yesterday to discuss the Vicjas Tribe's concerns regarding the County's wind energy ordinance amendment project. I have attached the meeting sign in sheet, agenda, and project summary we reviewed at the meeting. I have noted the meeting's follow-up items below. We look forward to working with you and appreciate your input.

Follow-up items: (County staff to provide)

- 1) Project Objectives
- 2) Borrego Springs Comment Letter
- 3) Definition of "disturbed area" per the limited small wind turbine alternative
- 4) Ground disturbance analysis for small wind turbines
- 5) Link to public review website: <http://www.sdcountry.ca.gov/dplw/ceqa/POD10007.html>
- 6) Revise/clarify Draft EIR Cultural Resources section regarding Traditional Cultural Properties, sacred viewsheds, ceremonial sites, etc.
- 7) Consider implementing a "decision maker" subcommittee

Please feel free to contact me if you have any questions.

Thank You

Matthew Schnelder

Land Use/Environmental Planner

County of San Diego, Policy & Ordinance Development

Department of Planning and Land Use

5201 Ruffin Road, Suite B

San Diego, CA 92123

Tel: 858-694-3714 Fax: 858-694-3373

VIEJAS

TRIBAL GOVERNMENT

P.O. Box 908
Alpine, CA 91903
#1 Viejas Grade Road
Alpine, CA 91901

Anthony R. Pico, Chairman
Robert Cita Welch, Vice Chairman
Anita R. Uqualla, Tribal Secretary
Samuel Q. Brown, Tribal Treasurer
Greybuck S. Espinoza, Councilman
Victor E. Woods, Councilman
Raymond "Bear" Cuero, Councilman

Phone: 6194453810
Fax: 6194455337
viejas.com

May 10, 2012

David Pallinger, Chairman
San Diego County Planning Commission
520 Ruffin Road, Suite B
San Diego, CA 92123

c/o Cheryl.Jones@sdcounty.gov

Re: May 11, 2012 Planning Commission Workshop Wind Energy Ordinance Amendment, Countywide

Dear Chairman Pallinger and Fellow Commissioners:

This letter is sent on behalf of the Viejas Band of Kumeyaay Indians. As you may know, Viejas has been tracking several of the many wind projects proposed in San Diego and Imperial Counties.

In general, Viejas is concerned about these particular facilities' impacts to tribal cultural resources, including Traditional Cultural Properties, and natural resources of cultural value to us, especially golden eagles. We have had several meetings with your staff, including one last week, to try and better understand what the goals are of the wind ordinance amendment and to express our concerns that tribal cultural values may not be being given the level of consideration and protection they require and to propose solutions where possible. We intend to continue meeting with your staff to see if we can reach consensus.

At this time, we have the following recommendations, and would respectfully request the Commission consider and direct staff to:

1. Conduct additional workshops: The issues surrounding the ordinance amendments are multifaceted and often complex. The potential adverse effects and impacts can be great and must be fully vetted and considered in a transparent manner. Also, we were disappointed to see that the Workshop Agenda does not contain a section for Cultural Resources. Additional workshops would provide for a more full agenda and better advance these important goals.

David Pallinger, Chairman
May 10, 2012
Page two

2. Conduct site visits including those of tribally-significant cultural areas: Such site visits should have tribal leaders and representatives present, who are knowledgeable about tribal culture and can help the Commissioners understand the cultural landscapes of San Diego County's backcountry and how large wind turbines could impact those areas. There is more at stake with the proposed ordinance than noise and biological impacts. The Commissioners should have the opportunity to understand that first-hand.

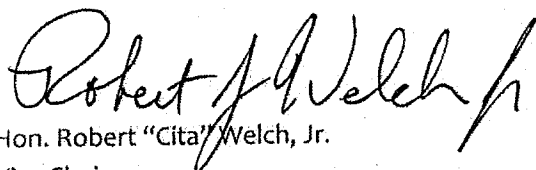
3. Form a subcommittee for tribal issues: This Commission subcommittee could develop a level of expertise on issues of tribal concern that would be beneficial not just regarding the proposed ordinance, but on other projects that come forward through the Commission so that there is a baseline of understanding when these issues come before it. The subcommittee could also sit in on SB 18 consultations, presently conducted between staff and tribes, which would provide a more direct appreciation by the decision makers of tribal concerns.

4. Consider the Limited Small Wind Alternative: While Viejas will continue to work with County staff to resolve remaining issues, this Alternative and any revisions to it, should be given full consideration by the Commission as it provides better consideration of tribal cultural resources.

We hope that this information is helpful to your Commission as you go through the Workshop process.

Sincerely yours,

THE VIEJAS BAND OF KUMEYAAY INDIANS



Hon. Robert "Cita" Welch, Jr.
Vice Chairman

cc:

Hon. Dianne Jacob

Matthew Schneider

Donna Beddow

Mark Slovick

Courtney Ann Coyle, Esq.



IBERDROLA RENEWABLES

April 5, 2012

VIA FIRST CLASS MAIL AND ELECTRONIC MAIL

Matt Schneider
County of San Diego Dep't of Planning and Land Use
Kearny Mesa Office
5201 Ruffin Road, Suite B
San Diego, CA 92123

**Re: POD 10-007, LOG NO. 09-00-003, SCH NO. 2010091030 - Request to Reschedule
Wind Ordinance Hearing to Allow Public Review of Final EIR and Revised
Ordinance**

Dear Mr. Schneider,

Tule Wind LLC, a wholly owned subsidiary of Iberdrola Renewables, LLC (Iberdrola Renewables) requests that the County reschedule the Planning Commission hearing on the proposed Wind Energy Ordinance, POD 10-007, LOG NO. 09-00-003, SCH NO. 2010091030. According to the notice we received this week, the hearing is currently scheduled for April 13, 2012, but the final environmental impact report (EIR) for the ordinance and the final draft of the ordinance that the staff will recommend for approval have yet to be released to the public.

For example, we made a number of substantive comments to the draft EIR, but have not yet seen the responses to those comments. We have requested copies of the revised ordinance and responses to comments. Until we see the staff's revised proposal, we are uncertain which experts we should arrange to attend the Planning Commission hearing, and these experts will not have had time to review the final ordinance and EIR before the scheduled hearing. Even if these materials are made public by the end of this week, it would leave inadequate time for public review of these important documents. Adequate time for the public – and for the Planning Commissioners themselves – to review these documents will be essential to a productive hearing and informed decision-making.

Accordingly, we ask the County to reschedule the Planning Commission hearing on the Wind Energy Ordinance until the public has at least 15 business days to review and comment on the final environmental impact report and the final draft of the ordinance that the staff will present to the Planning Commission.

IBERDROLA RENEWABLES, Inc.
1125 NW Couch St., Suite 700
Portland, OR 97209
Telephone (503) 796-7000
www.iberdrolarenewables.us



**IBERDROLA
RENEWABLES**

If you have any questions regarding this request, please contact me at 503-796-7781.

Sincerely,

Jeffrey B. Durocher, Esq.
Iberdrola Renewables, LLC.

cc: Eric Gibson, Director, Dep't of Planning and Land Use
Cheryl Jones, San Diego County Planning Commission

Schneider, Matthew

From: Pinney Caldwell [pincal@sbcglobal.net]
Sent: Friday, July 20, 2012 8:16 AM
To: Jones, Cheryl; Schneider, Matthew
Cc: Jacob, Dianne; Donna Tisdale
Subject: WIND ENERGY ORDINANCE & PLAN AMENDMENTS; POD10-007

TO SAN DIEGO COUNTY PLANNING COMMISSIONERS:

FROM: Clifford C. Caldwell and Concepcion Caldwell

We have received a copy of the Public Health Position Statement - Human Health Effects of Wind Turbines dated July 10, 2012. It is our understanding that it is set for hearing today as part of the agenda item Wind Energy Ordinance Amendment; POD10-007; Countywide.

As we own the properties at 2754 and 2750 Ribbonwood Road, Boulevard, CA, it is interesting how the report by the Health and Human Services Agency states that the effects of wind turbines have "no direct pathological effects" although they state that certain effects are not well understood (i.e. sound, noise and annoyance). This is an affirmative conclusion that they are acceptable risks as long as the County does not understand them. Is the County going to make us whole if their assumptions are wrong? Or is it an acceptable risk to the County as long as it is someone else that has the problem and/or because these other people are fewer in number.

As we understand the report's conclusion, since the County does not fully understand the health risk, therefore such effects must be acceptable.

In addition, having an individual in our family that is on anti-seizure medication, we are amazed at how the County simply states that since only a small part of the population is subject to seizures that the minimal risks are acceptable to them. They find it acceptable because they are not part of those at risk. Has the County even tried to determine if there are any individuals in the Boulevard area who are at risk for such type of seizures.

In summary, we feel the County's report is simply conjecture without any type of serious study, that puts our small group (as a result of sparsity of housing) at risk. We object to the findings in said report as they lack any type of substantiation.

We have read the Boulevard Planning Group's comments and its reply to the County about these matters and fully support the stated position of the Boulevard Planning Group.

Very truly yours,

Concepcion Caldwell and Clifford Caldwell
2754 and 2750 Ribbonwood Road
Boulevard, CA

Stephan C. Volker
Joshua A.H. Harris
Alexis E. Krieg
Stephanie L. Abrahams
Daniel P. Garrett-Steinman
Jamey M.B. Volker
M. Benjamin Eichenberg

Law Offices of
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436 – 14th Street, Suite 1300
Oakland, California 94612
Tel: (510) 496-0600 ♦ Fax: (510) 496-1366
svolker@volkerlaw.com

11.147.01

April 12, 2012

VIA EMAIL AND U.S. MAIL

Matt Schneider
Department of Planning and Land Use
5201 Ruffin Road, Suite B
San Diego, California 92123-1666
matthew.schneider@sdcounty.ca.gov

Re: Comments of The Protect Our Communities Foundation, Backcountry Against Dumps and Donna Tisdale on the San Diego County Wind Energy Ordinance Amendment and its General Plan Amendment and EIR (POD 10-007 (District: All))

I. INTRODUCTION

These comments are submitted on behalf of The Protect Our Communities Foundation, ("POC"), Backcountry Against Dumps ("BAD") and Donna Tisdale (collectively "Conservation Groups") in response to San Diego County's (the "County's") proposed Wind Energy Zoning Ordinance Amendment and General Plan Amendment ("Amendments") which are under consideration by the Planning Commission at its public hearing on April 13, 2012. Conservation Groups commend the County for preparing an EIR on the Amendments as we had previously requested, and appreciate the opportunity to submit these comments on the Amendments and their EIR. Please include our comments in the public record.

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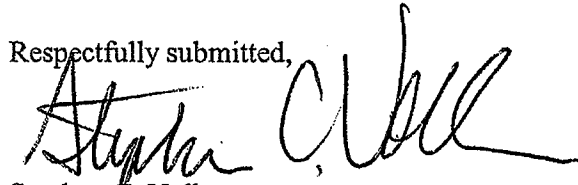
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April 12, 2012

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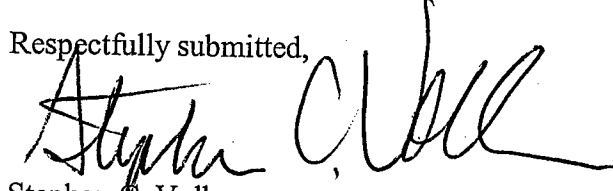
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Magda Havas¹ and David Colling²

Abstract

People who live near wind turbines complain of symptoms that include some combination of the following: difficulty sleeping, fatigue, depression, irritability, aggressiveness, cognitive dysfunction, chest pain/pressure, headaches, joint pain, skin irritations, nausea, dizziness, tinnitus, and stress. These symptoms have been attributed to the pressure (sound) waves that wind turbines generate in the form of noise and infrasound. However, wind turbines also generate electromagnetic waves in the form of poor power quality (dirty electricity) and ground current, and these can adversely affect those who are electrically hypersensitive. Indeed, the symptoms mentioned above are consistent with electrohypersensitivity. Sensitivity to both sound and electromagnetic waves differs among individuals and may explain why not everyone in the same home experiences similar effects. Ways to mitigate the adverse health effects of wind turbines are presented.

Keywords

wind turbine, dirty electricity, power quality, ground current, contact current, electrohypersensitivity, noise, infrasound, vibroacoustic disease, wind turbine syndrome

Introduction

With growing concern about climate change, the carbon budget, depletion of fossil fuels, air pollution from dirty coal, radiation from nuclear power plants, and the need for a secure energy supply, more attention and funding are being diverted to renewable energy. Among the various types of renewable energy, wind has received a lot of attention due, in part, to opposition from communities earmarked for wind turbines and from communities that have experienced wind turbines firsthand.

Some people who live near wind turbines report difficulty sleeping and various symptoms of ill health and attribute these problems to noise and shadow flicker—two elements they can perceive. Indeed the U.S. National Research Council (Risser et al., 2007) identify noise and shadow flicker as the two key impacts of wind turbines on human health and well-being.

Not all health agencies, however, recognize that sound waves from wind turbines may cause adverse health effects. Following a review of the literature, the Chief Medical Officer of Health for Ontario (2010), concluded

that while some people living near wind turbines report symptoms such as dizziness, headaches, and sleep disturbance, the scientific evidence available to date does not demonstrate a direct causal link between

wind turbine noise and adverse health effects. The sound level from wind turbines at common residential setbacks is not sufficient to cause hearing impairment or other direct health effects, although some people may find it annoying.

Low frequency sound and infrasound from current generation upwind model turbines are well below the pressure sound levels at which known health effects occur. Further, there is no scientific evidence to date that vibration from low frequency wind turbine noise causes adverse health effects.

What specifically is responsible for the illness reported near wind turbines is controversial; while some of this controversy is scientifically valid, some of it is politically motivated (Phillips, 2010).

It is intriguing that not everyone in the same home experiences symptoms, and the symptoms are not necessarily worse for those nearest the turbines. Indeed, the situation may be much more complex than noise and shadow flicker.

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Why do some people who live near wind turbines become sick while others feel no ill effects? What aspects of wind power generation and distribution are responsible for the health problems? What can be done to minimize adverse human biological and health effects? These are some of the questions addressed in this report.

Wind Turbines Make Waves

What aspects of wind power generation and distribution are responsible for the adverse health effects experienced by those who live near wind turbines?

The short answer to this question is that *wind turbines make waves*. They make pressure waves and electromagnetic waves. The pressure waves (or sound waves) generated by the moving turbines can be heard as noise and/or perceived as infrasound. The electromagnetic waves are generated by the conversion of wind energy to electricity. This conversion produces high-frequency transients and harmonics that result in poor power quality. These high frequencies can flow along the wires (dirty electricity) and along the ground, thereby causing ground current. These four types of waves—noise, infrasound, dirty electricity, and ground current—and shadow flicker are each likely to contribute to ill health among those who live near wind turbines.

Characteristics of Sound Waves and Electromagnetic Waves

Sound waves are longitudinal waves that require a medium for transport. They travel at the speed of sound (340 meters/second) through air and are much slower than electromagnetic waves that travel at the speed of light (300,000,000 meters/second) and can travel through a vacuum. Both sound waves and electromagnetic waves have a frequency (cycles per second) and an intensity (amplitude of the wave).

Frequency refers to the number of waves or cycles per second and is known as pitch for sound. The A above middle C, for example, is set to a frequency of 440 cycles per second (hertz, abbreviated as Hz). The audible range for the human ear is between 20 and 20,000 Hz. Frequencies below 20 Hz are referred to as “infrasound,” and, although they cannot be heard, they can still have an effect on the body. Infrasound can travel much greater distances than higher frequency sound waves and could potentially reach and affect a much larger population.

The frequencies of electromagnetic waves, generated by wind turbines, fall within two ranges of the electromagnetic spectrum: extremely low frequency (ELF), below 1,000 Hz; and the lower range (kilohertz [kHz] to megahertz [MHz]) of the radio frequency radiation (RFR) band. Electromagnetic waves can enter homes by various paths: through the air, along wires, through the ground, and via plumbing and other metal structures. Electromagnetic waves travelling across the ground contribute to ground current.

Intensity is measured by the amplitude of the wave and, for sound, is measured in decibels (dB). Vibrations with the same frequency but different amplitude will sound the same, but one will be louder than the other. The decibel scale is logarithmic. A quiet bedroom is at 25 dB, conversation is around 60 dB, a rock group is at 110 dB, and the human threshold of pain is at 140 dB.

The intensity of electromagnetic waves is measured in various ways: electric field, magnetic field, voltage, current, and power density. The biological effects of electromagnetic energy are a function of frequency, intensity, and both the manner and the duration of exposure.

Pressure Waves: Noise

Most people who live near wind turbines and complain of ill effects blame the effects on the noise generated by the turbines (Frey & Hadden, 2007).

Everything changed . . . when the wind turbines arrived . . . approximately 700 metres away from our property . . . Within days of the windfarm coming into operation we began to hear a terrible noise . . . The noise drove us mad. Gave us headaches. Kept us awake at night. Prevented us from having windows and doors open in hot weather, and was extremely disturbing.

This noise is like a washing machine that's gone wrong. It's whooshing, drumming, constant drumming, noise. It is agitating. It is frustrating. It is annoying. It wears you down. You can't sleep at night and you can't concentrate during the day . . . It just goes on and on . . . It's torture . . . [4 years later] You just don't get a full night's sleep and when you drop off it is always disturbed and only like “cat napping.” You then get up, tired, agitated and depressed and it makes you short-tempered . . . Our lives are hell.

The French National Academy of Medicine (Chouard, 2006) issued a report that concludes,

People living near the towers, the heights of which vary from 10 to 100 meters, sometimes complain of functional disturbances similar to those observed in syndromes of chronic sound trauma . . .

The sounds emitted by the blades being low frequency, which therefore travel easily and vary according to the wind . . . constitute a permanent risk for the people exposed to them . . .

. . . sound levels 1 km from an installation occasionally exceeded allowable limits.

. . . the Academy recommends halting wind turbine construction closer than 1.5 km from residences. (Translated from French)

Noise, especially at night, has been associated with an increase in stress hormones leading to hypertension, stroke, heart failure, and immune problems. It is discussed in greater detail elsewhere in this journal.

Pressure Waves: Infrasound

Repetitive noise can be disturbing, especially at night, when sound seems amplified. However, pressure waves at levels outside the range of human hearing can also have unpleasant side effects.

In Nova Scotia, one family was unable to remain in their home and blamed their loss of sleep and headaches on vibrations from 17 turbines (Keller, 2006).

The d'Entremont family complained of noise and low frequency vibrations in their house after the wind turbines began operation in May 2005. The inaudible noise deprived his family of sleep, gave his children and wife headaches, and "made it impossible for them to concentrate." They now live nearby; if they return to their home, the symptoms return.

Natural Resources Canada, which oversees funding for wind farm projects, found no problems with low-frequency noise or infrasound. The government report concludes that the measurements:

indicate sound at infrasonic frequencies below typical thresholds of perception; infrasound is not an issue. (cited in Frey & Hadden, 2007)

Gordon Whitehead, a retired audiologist with 20 years of experience at Dalhousie University in Halifax, conducted tests and found similar results but came up with a different conclusion:

They're [Natural Resources Canada] viewing it from the standpoint of an engineer; I'm viewing it from the standpoint of an audiologist who works with ears . . . The report should read that (the sound) is well below the auditory threshold for perception. In other words, it's quiet enough that people would not be able to hear it. But that doesn't mean that people would not be able to perceive it.

" . . . low-frequency noise can affect the balance system of the ear, leading to a range of symptoms including nausea, dizziness and vision problems. It's not perceptible to the ear but it is perceptible. It's perceptible to people with very sensitive balance mechanisms and that's generally people who get very easily seasick.

Resonance may explain why infrasound is harmful at low intensities. Different parts of the human body have different resonance frequencies. When the external frequency generated by a wind turbine approaches the resonance frequency

of a part of the human body, that body part will preferentially absorb the energy and begin to vibrate. For example, frequencies that affect the inner ear (between 0.5 and 10 Hz) can interfere with balance, cause dizziness or vertigo, contribute to nausea, and be experienced as tinnitus or ringing in the ears. According to the International Standards Organization (ISO Standards 2631), frequencies for the eye are between 20 and 90 Hz, head 20 and 30 Hz, chest wall 50 and 100 Hz, abdomen 4 and 8 Hz, and spinal column 10 and 12 Hz. Some of the symptoms documented at infrasonic frequencies (between 4 and 20 Hz) include general feeling of discomfort, problems with breathing, abdominal and chest pain, urge to urinate, lump in throat, effect on speech, and head symptoms (Frey & Hadden, 2007).

According to a report by the U.S. Air Force, Institute for National Security Studies, acoustic infrasound can have dramatic and serious effects on human physiology (Bunker, 1997).

Acoustic, infrasound: very low frequency sound which can travel long distances and easily penetrate most buildings and vehicles. Transmission of long wavelength sound creates biophysical effects, nausea, loss of bowels, disorientation, vomiting, potential organ damage or death may occur. Superior to ultrasound because it is "inband," meaning it does not lose its properties when it changes mediums such as air to tissue. By 1972 an infrasound generator had been built in France, which generated waves at 7Hz. When activated it made the people in range sick for hours.

In a paper known as "The Darmstadt Manifesto," published in September 1998 by the German Academic Initiative Group and endorsed by more than 100 university professors in Germany, the German experience with wind turbines is described as follows (cited in Frey & Hadden, 2007):

More and more people are describing their lives as unbearable when they are directly exposed to the acoustic and optical effects of wind farms. There are reports of people being signed off sick and unfit for work, there is a growing number of complaints about symptoms such as pulse irregularities and states of anxiety, which are known to be from the effects of infrasound [sound frequencies below the normal audible limit].

Infrasound is influenced by topography, distance, and wind direction (Rogers, Manwell, & Wright, 2006) and differs from home to home and room to room because each room is a distinct cavity with its own resonant frequency. Whether a door is open or closed can alter the effect.

The biological effects of low-frequency noise (20-100 Hz) and infrasound (less than 20 Hz) are a function of intensity, frequency, duration of exposure, and direction of the vibration.

Wind Turbine Syndrome and Vibroacoustic Disease

Exposure to low-frequency noise and infrasound may produce a set of symptoms that include depression, irritability, aggressiveness, cognitive dysfunction, sleep disorder, fatigue, chest pain/pressure, headaches, joint pain, nausea, dizziness, vertigo, tinnitus, stress, heart palpitations, and other symptoms. Not everyone has the same sensitivity. Those who experience motion sickness (car, boat, plane), get dizzy or nauseous on carnival rides, have migraine headaches, or have eye or ear problems may be particularly susceptible to low-frequency vibrations.

Two different “diseases” have been associated with low-frequency noise exposure and infrasound. They are wind turbine syndrome—coined by Pierpont (2009) in her book by the same name—and vibroacoustic disease (VAD). VAD is a whole-body, systemic pathology characterized by the abnormal proliferation of extracellular matrices and caused by excessive exposure to low-frequency noise (Castelo Branco & Alves-Pereira, 2004). These two “diseases” differ as described by Pierpont (2009).

Wind Turbine Syndrome, I propose, is mediated by the vestibular system—by disturbed sensory input to eyes, inner ears, and stretch and pressure receptors in a variety of body locations. These feed back neurologically onto a person’s sense of position and motion in space, which is in turn connected in multiple ways to brain functions as disparate as spatial memory and anxiety. Several lines of evidence suggest that the amplitude (power or intensity) of low frequency noise and vibration needed to create these effects may be even lower than the auditory threshold at the same low frequencies.

Vibroacoustic Disease, on the other hand, is hypothesized to be caused by direct tissue damage to a variety of organs, creating thickening of supporting structures and other pathological changes. The suspected agent is high amplitude (high power or intensity) low frequency noise. (p. 13)

VAD seems to be dose dependent, with symptoms becoming progressively worse with continued exposure. Three stages have been identified based on 70 aircraft technicians who, presumably, were exposed to much higher intensities of low-frequency noise than those who live near wind turbines (Castelo Branco, 1999, Castelo Branco & Alves-Pereira, 2004).

Stage 1: Mild, 1 to 4 years, slight mood swings, indigestion, heartburn, mouth/throat infections, bronchitis

Stage 2: Moderate, 4 to 10 years, depression, aggressiveness, pericardial thickening, light to moderate hearing impairment, chest pain, definite mood swings, back pain, fatigue, skin infections (fungal,

viral, parasitic), inflammation of stomach lining, pain during urination, blood in urine, conjunctivitis, allergies

Stage 3: Severe, more than 10 years, myocardial infarction, stroke, malignancy, epilepsy, psychiatric disturbances, hemorrhages (nasal, digestive, conjunctive mucosa), varicose veins, hemorrhoids, duodenal ulcers, colitis, decrease in visual acuity, headaches, severe joint pain, intense muscular pain, neurological disturbances

Whatever name is given to the symptoms, the symptoms are real and can be caused by low-frequency sound waves and infrasound.

Electromagnetic Waves

One undesirable consequence of wind-generated electricity is poor power quality due to variable weather conditions, mechanical construction of the towers, and the electronic equipment used (Lobos, Rezmer, Sikorski, & Wacławek, 2008). Electricity in North America has a frequency of 60 Hz and is a sine wave when viewed on an oscilloscope (Figure 1). When a wind turbine generates electricity, the frequency must be converted to 60 Hz by power converters; that conversion generates a large spectrum of current and voltage oscillations leading to poor power quality (Lobos et al., 2008). Wind turbines can generate a wide range of frequencies—from less than 1 Hz (Lobos et al., 2008), with the majority of the frequencies in the kHz range associated with power conversion.

Dirty Electricity

High-frequency transient spikes that contribute to poor power quality, also known as dirty electricity, can flow along wires, damage sensitive electronic equipment, and adversely affect human and animal health.

After wind turbines were activated in Ripley, Ontario, several of the residents complained of ill health. Residents suffered from headaches, poor sleep, elevated blood pressure (requiring medication), heart palpitations, itching, ringing and pain in the ears, watering eyes, and pressure on the chest causing difficulty breathing. These symptoms disappear when the residents leave the area. Some residents were forced to move out of their homes because the symptoms were so severe. Locals complain of headaches and poor radio reception when they drive near these power lines.

One of the authors (DC) measured the power quality near several residences where people were unwell. The primary neutral-to-earth voltage (PNEV) is the electrical potential difference between the earth and the neutral wire on the primary distribution line, as shown in Figure 2. Measurements taken before wind turbines were installed and after they were installed and operating (Figure 3) clearly show the distortion (spikes on the waveform) generated by the wind turbines.

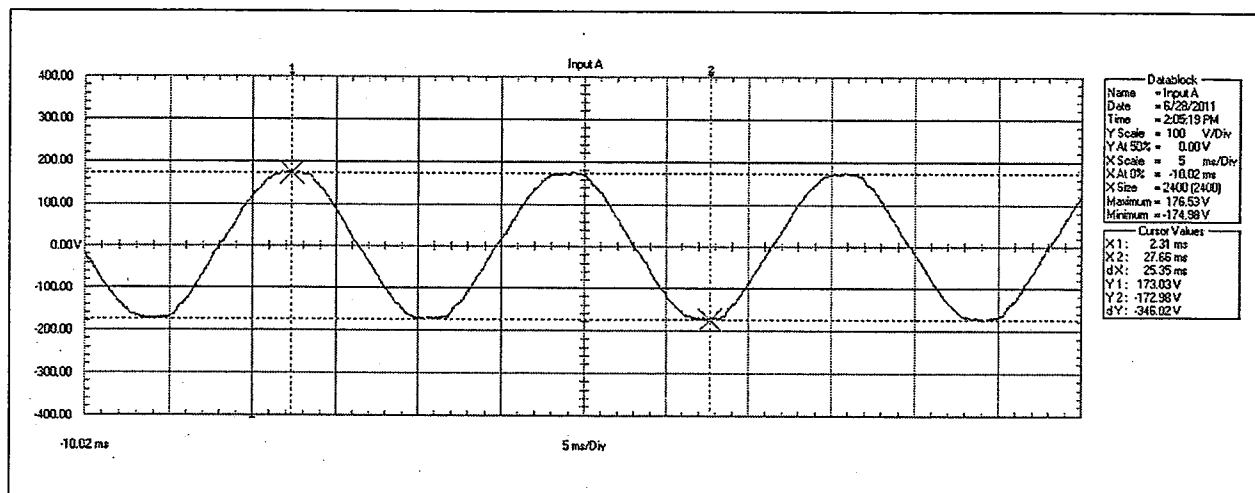


Figure 1. Good power quality exemplified by the 60-Hz sine wave

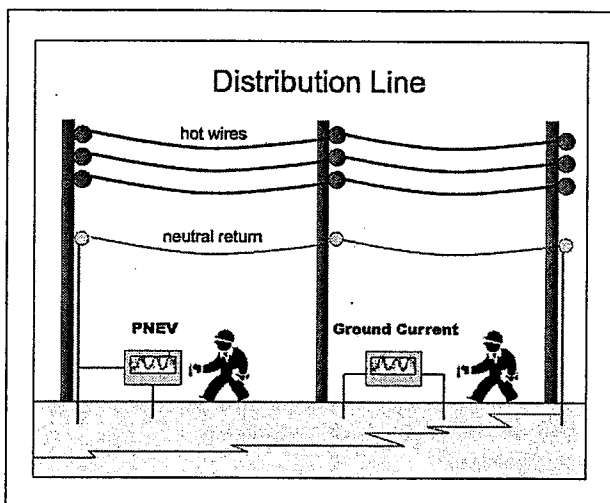


Figure 2. Diagram demonstrating how primary neutral-to-earth voltage (PNEV) and ground voltage measurements are taken

In this area, wind turbines are variable speed and are interconnected. The collection lines connecting the wind turbines to the substation are attached to the same utility pole as the home owners' lines.

According to one of the authors (DC; September 30, 2008),

We had four families move out of their homes and now if I spend too much time in these homes I get the same symptoms, which is ear aches, ringing in the ears and pressure in the ears. [name removed] eventually buried a portion of the line but have only isolated the lines by insulators so it is better, however there is still

some high frequency coming into the houses. The three families that now have buried lines are back in their homes, but things are far from ideal.

Dirty electricity in the kHz range affects human health; this has been shown in schools and homes in both Canada and the United States. Power quality can be improved both on electrical wires by using power line filters (Ontario Hydro, 1998) and inside buildings by using special surge suppressors or power filters that dampen the voltage spikes (<http://www.stetzerelectric.com>).

In one Wisconsin School that had "sick building syndrome," once power quality was improved, the health of both teachers' and students' improved. According to the school nurse, both staff and students have more energy, fewer allergies, and fewer migraine headaches, and asthmatics rely less on their inhalers (Havas, 2006a).

In a Toronto School, improvements in power quality were accompanied by improvements in teachers' health and students' behavior. Teachers were less tired, less frustrated, less irritable; they had better health and more energy; they had a greater sense of satisfaction and accomplishment; they were more focused and experienced less pain. Students' behavior also improved especially in the elementary grades (Havas, Illiatovitch, & Proctor, 2004). Similar results were reported in a placebo-blinded study in three Minnesota schools (Havas & Olstad, 2008).

Dirty electricity has been associated with increased risk of various types of cancers among teachers in a California school (Milham & Morgan, 2008), with higher blood sugar levels among diabetics, and with exacerbation of tremors and difficulty walking among those with multiple sclerosis (Havas, 2006b). People who are adversely affected by dirty electricity are classified as electrically hypersensitive.

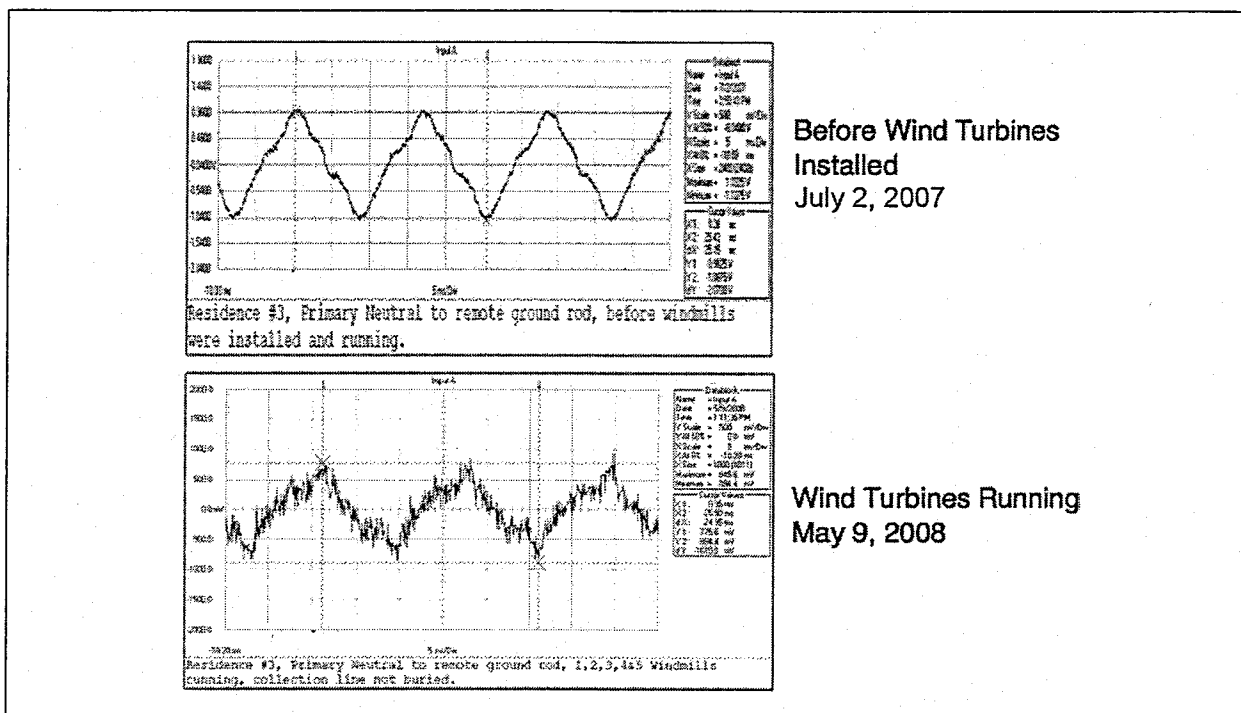


Figure 3. Primary neutral-to-earth voltage (PNEV) at Residence No. 3 in Ripley, Ontario, before wind turbines were installed (July 2, 2007) and when five wind turbines were operating (May 9, 2008)
 Note. Collection line was not buried.

Ground Current

Just as dirty electricity can flow along wires, it can also flow along the ground resulting in ground current. Ground current (often measured as voltage and called stray voltage or tingle voltage) is a serious problem in certain locations and has been shown to adversely affect the health of farm families and the health and productivity of farm animals, especially dairy cattle.

The Ontario Federation of Agriculture (2007) provides information on symptoms experienced by farm animals, pets, and people who are exposed to tingle voltage as follows:

Farmers and their families who suffer from immune disorders such as allergies or rheumatoid arthritis find their symptoms worsen or go into remission in close coordination with livestock symptoms. Periods of fatigue increase. Sleep disorders may increase.

Cats leave the farm, become ill, cease to bear litters or have small, unhealthy litters, or die; coats are usually dull and shaggy and eyes are runny.

Horses may paw the ground and shy away from watering or feeding troughs; behaviour and handling becomes more difficult.

Pigs often take to ear and tail biting; mastitis and baby pig scours are common; piglet mortality may increase.

Cattle lap water from the trough or bowl; feed in the bottom of the manger is not cleaned up; milk out is slow and uneven; cows are reluctant to enter the milk parlour and quick to leave; slow growth in calves and heifers; somatic cell counts are high; unexplained spontaneous abortions of calves; bulls become markedly more irritable.

According to the *National Electrical Safety Code (NESC) Handbook* (Clapp, 1997),

When the earth returns were used in some rural areas prior to the 1960's, they became notorious offenders in dairy areas because circulating currents often cause both step and touch potentials.

In some cases, they have adversely affected milking operations by shocking the cattle when they were connected to the milking machines, and have affected feeding. (p. 152)

According to Lefcourt (1991) in the U.S. Department of Agriculture book titled *Effects of Electrical Voltage/Current on Farm Animals: How to Detect and Remedy Problems*:

The effect of a transient voltage superimposed on the regular power voltage (dc or ac) is to cause a momentary

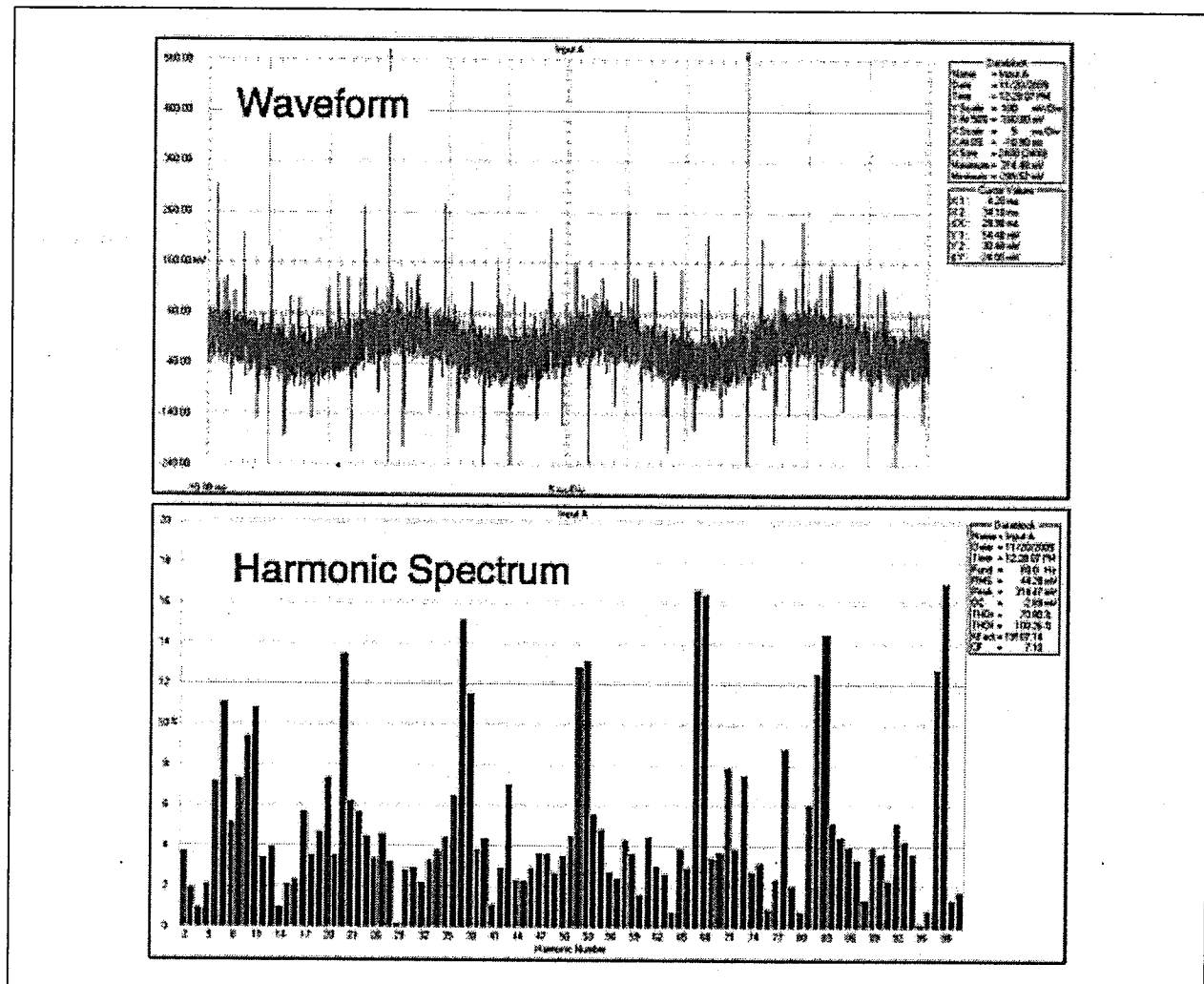


Figure 4. Ground voltage measured at the Palm Springs wind farm in California using 50 feet of copper wire attached to two metal rods in the earth

Note. The top graph shows the distorted 60-Hz waveform, and the bottom graph shows the harmonic frequencies. Data courtesy of Dr. Sam Milham.

change in the waveform. When the transient causes the momentary voltage to be greater than normal, it may cause a transient current to flow in an animal. If the transient waveform has sufficient energy (magnitude and duration), there may be an animal response. (p. 63-64)

Indeed, dirty electricity flowing along the ground may be more harmful to farm animals than the 60-Hz ground current (Hillman et al., 2003):

Cows were sensitive to harmonic distortions of step-potential voltage, suggesting that utility compliance with IEEE standards on dairy farms may need to be addressed.

Power quality varied greatly from farm to farm and day to day. Milk production responses to changes in power quality varied inversely with the number of transient events recorded with event recorders, oscilloscope, and power quality meters. Harmonics often gave better estimates of electrical effects on milk production than voltage *per se*. (p. 19)

Do wind turbines generate ground current? They can if proper safeguards are not taken. Generally, this is a problem with power distribution once the energy leaves the turbine.

Figure 4 shows the waveform of ground voltage near an industrial wind farm in Palm Springs, California (as shown in Figure 5 photographs). The waveform distortion in Figure 3 and 4 are considerable when compared with Figure 1.



Figure 5. Wind farm in Palm Springs, California, showing (A) location of ground voltage readings; (B), view of wind turbines from the ground; and (C) view of wind turbines from the air
 Note. Photograph A from Dr. Sam Milham. Photographs B and C from Google maps.

Burying the collection line may not eliminate the ground voltage but can improve power quality, as shown in Figure 6.

Just as animals are adversely affected by dirty ground current, so are people. If ground current enters a home via the plumbing, touching any part of the plumbing (e.g., faucet) induces a current in the body, known as contact current.

In one Ripley home, the frequency fingerprint (relative intensities of various frequencies) on the plumbing (sink to floor measurement) was similar to the PNEV, indicating that the source of the ground voltage was the wind turbines' collection line (Figure 7). In this home, the sink to floor contact current was calculated to be 400 microamperes (peak to peak based on 200 millivolts and 500 ohms), and this value is 22 times higher than levels associated with cancer according to Kavet, Zaffanella, Daigle, and Ebi (2000).

"The absolute (as well as modest) level of contact current modeled (18 micro Amps) produces average electric fields in tissue along its path that exceed 1 mV/m. At and above this level, the NIEHS Working Group [1998] accepts that biological effects relevant to cancer

have been reported in "numerous well-programmed studies." (p. 547)

Wertheimer, Savitz, and Leeper (1995) documented the link between ground current and cancer in Denver, Colorado. They found that leukemia risk increased by 300% among children exposed to elevated magnetic field from ground current that enters the home through conductive plumbing.

Electrohypersensitivity (EHS)

Why do some people who live near wind turbines become sick while others feel no ill effects?

Exposure to both pressure waves and electromagnetic waves is highly variable—spatially and temporally—as is sensitivity to these vibrations. Not everyone in the same home is going to have the same exposure or the same sensitivity. People who have balance problems, experience motion sickness, or have ear or eye problems are more likely to react to low-frequency sound vibrations. Those who are electrically hypersensitive are more likely to suffer from dirty electricity

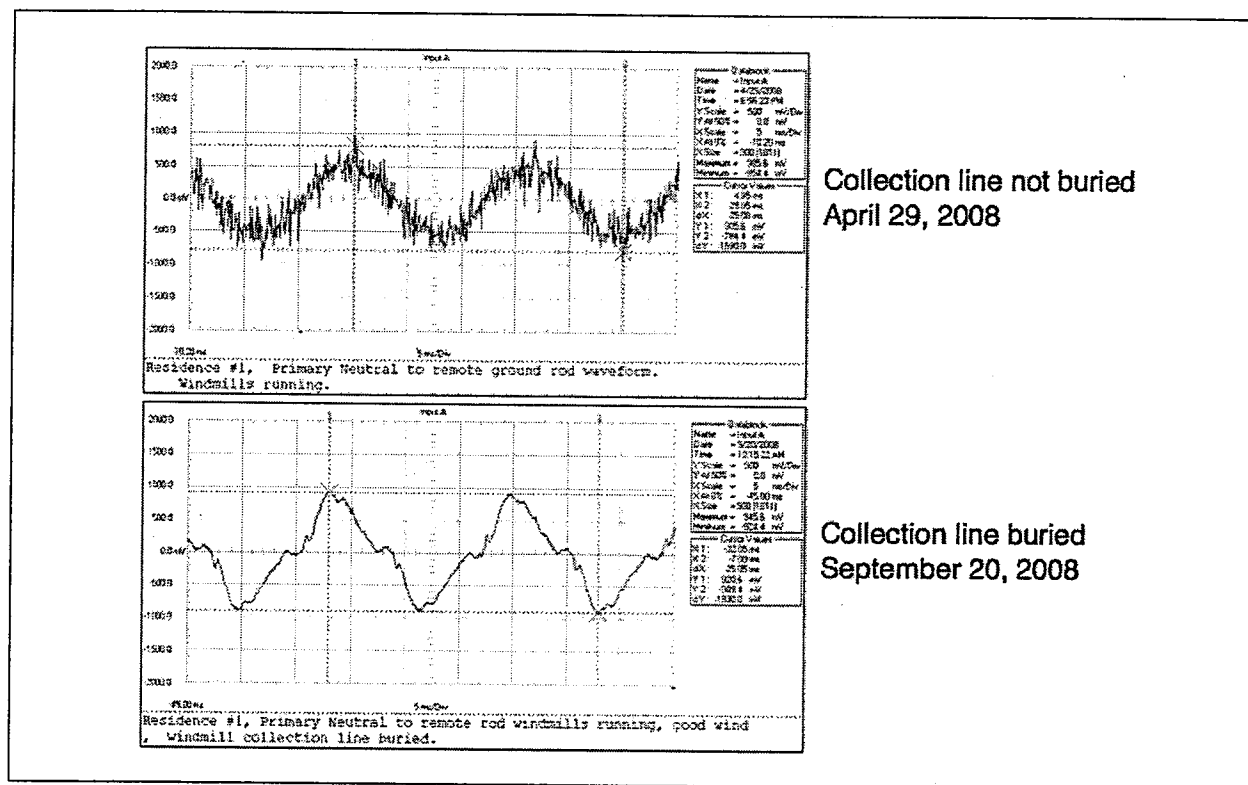


Figure 6. Primary neutral-to-earth voltage (PNEV) at Residence #1 in Ripley, Ontario, when wind turbines were operating. Note. Collection line from wind turbines was buried on September 20, 2008 (bottom graph), but not on April 29, 2008 (top graph).

and contact current. As a result, people living in the same home may have very different sensitivities and may respond differently to these vibrations.

At the Working Group meeting on EMF Hypersensitivity in Prague, the World Health Organization (2004) described electrosensitivity as

a phenomenon where individuals experience adverse health effects while using or being in the vicinity of devices emanating electric, magnetic, or electromagnetic fields (EMFs).

Whatever its cause, EHS is a real and sometimes a debilitating problem for the affected persons, while the level of EMF in their neighborhood is no greater than is encountered in normal living environments. Their exposures are generally several orders of magnitude under the limits in internationally accepted standards.

Symptoms include cognitive dysfunction (memory, concentration, problem solving); fatigue and poor sleep; body aches and headaches; mood disorders (depression, anxiety, irritability, frustration, temper); nausea; problems with balance, dizziness, and vertigo; facial flushing, skin irritations, and skin rashes; chest pressure, rapid heart rate, and altered

blood pressure; ringing in the ear (tinnitus); and nosebleeds. A comprehensive list of the symptoms is provided in Table 1.

In Sweden, EHS is recognized as a functional impairment (not as a disease). Between 230,000 and 290,000 Swedes (about 3% of the Swedish population) may be electrohypersensitive (Johansson, 2006). The number of people complaining of EHS seems to be increasing as is the medication sold to deal with the symptoms of insomnia, pain, fatigue, depression, and anxiety. By 2017, as many as 50% of the population may experience these symptoms (Hallberg & Oberfeld, 2006).

Some individuals may have a predisposition to EHS. Those who have experienced physical trauma to their nervous system (whiplash), electrical trauma in the form of multiple shocks or several severe shocks, and/or chemical exposure to mercury or pesticides are likely to be more electrically sensitive. Children, the elderly, and those with impaired immune systems are also likely to be more electrically sensitive.

It is not possible to determine which factors are contributing to ill health until appropriate monitoring is conducted and steps are taken to reduce exposure to the offending agents. Monitoring of both electromagnetic waves and pressure waves in homes where people report ill health is highly recommended as are the mitigation techniques mentioned below

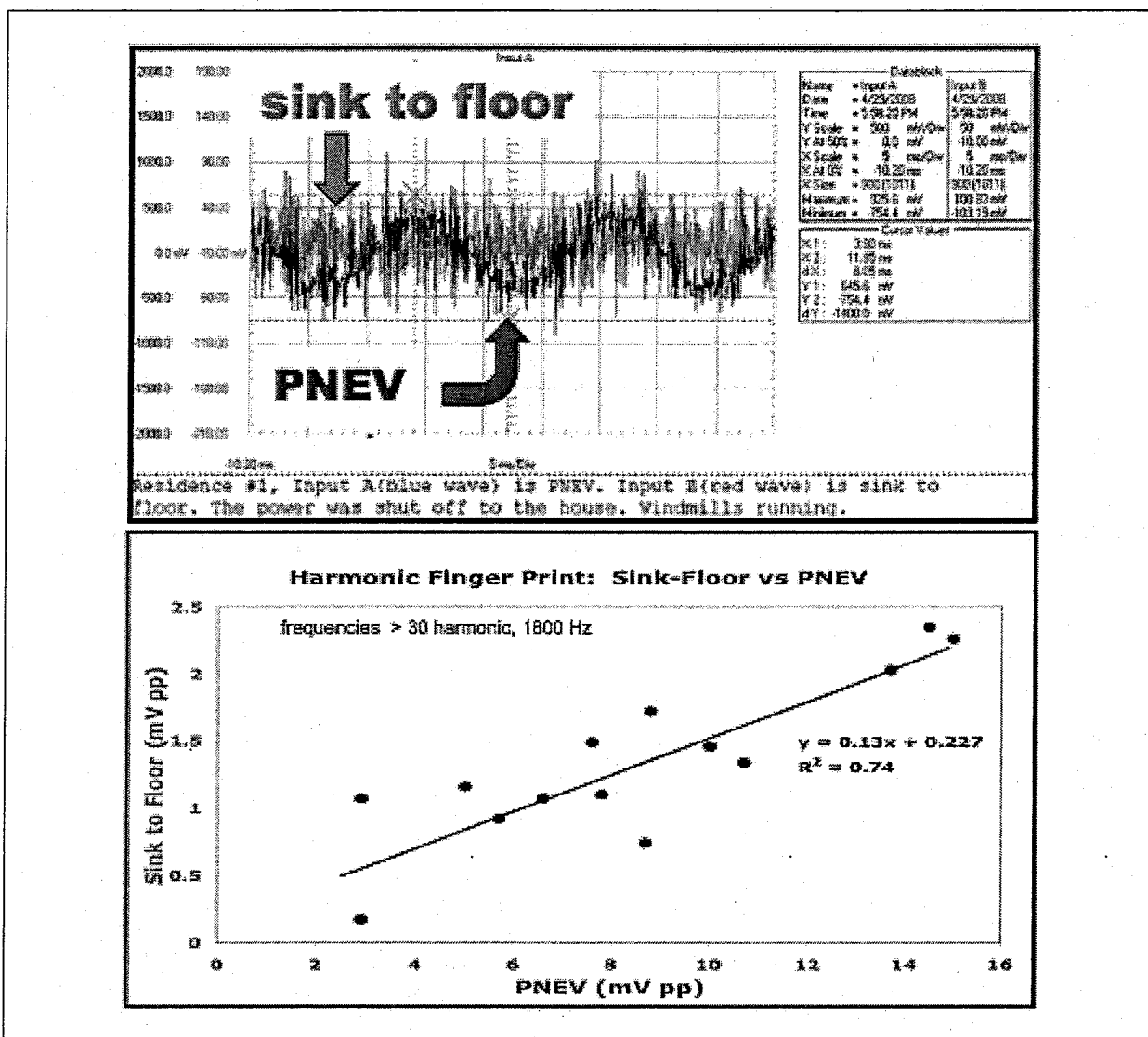


Figure 7. The primary neutral-to-earth voltage (PNEV) and the sink-to-floor voltage for Residence 1 in Ripley, Ontario (top graph), and the harmonic figure print for these voltages (bottom graph).

Recommendations

What can be done to minimize adverse biological and health effects for those living near wind turbines?

One obvious step is to eliminate or reduce exposure to the agent(s) causing the illness.

1. To minimize noise and exposure to infrasound, the following steps should be taken:
 - a. Wind turbines should be placed as far away as possible from residential areas. The French National Academy of Medicine (Chouard, 2006) recommends 1.5 km from residential areas.
 - b. Buffers can be constructed to disrupt pressure waves and to absorb or deflect sound waves in areas

where turbines are closer to homes or where problems have been documented,

2. To improve power quality, the following steps should be taken:
 - a. The electricity should be "filtered" at all inverters before it leaves the wind turbine. Ontario Hydro (1998) provides information on power line filters and other ways to improve power quality.
 - b. The collector lines from the wind turbines should be attached to utility poles that do not provide power to homes.
 - c. Power from the substation supplied by the wind turbines should be filtered before it is distributed to customers.

Table 1. Comprehensive List of Electrohypersensitivity (EHS) Symptoms (Bevington, 2010)

Auditory	Dermatological	Musculoskeletal	Ophthalmologic
earaches, imbalance, lowered auditory threshold, tinnitus	brown 'sun spots', crawling sensations, dry skin, facial flushing, growths & lumps, insect bites & stings, severe acne, skin irritation, skin rashes, skin tingling, swelling of face/neck	aches / numbness pain / prickling sensations in: bones, joints & muscles in: ankles, arms, feet legs, neck, shoulders, wrists, elbows, pelvis, hips, lower back, cramp / tension in: arms, legs, toes, muscle spasms, muscular paralysis, muscular weakness, pain in lips, jaws, teeth with amalgam fillings, restless legs, tremor & shaking	eyelid tremors/'tics', impaired vision, irritating sensation, pain / 'gritty' feeling, pressure behind eyes, shiny eyes, smarting, dry eyes
Cardiovascular altered heart rate, chest pains, cold extremities especially hands & feet, heart arrhythmias, internal bleeding, lowered/raised blood pressure, nosebleeds, shortness of breath, thrombosis effects	Emotional anger, anxiety attacks, crying, depression, feeling out of control, irritability, logorrhoea, mood swings,	Neurological faintness, dizziness, 'flu-like symptoms', headaches, hyperactivity, nausea, numbness, sleep problems, tiredness	Other Physiological abnormal menstruation, brittle nails, hair loss, itchy scalp, metal redistribution, thirst / dryness of lips, tongue, eyes
Cognitive confusion, difficulty in learning new things, lack of concentration, short / long-term memory impairment, spatial disorientation	Gastrointestinal altered appetite, digestive problems, flatulence, food intolerances Genito-urinary smelly sweat / urine, urinary urgency, bowel urgency		Respiratory asthma, bronchitis, cough /throat irritation, pneumonia, sinusitis Sensitisation allergies, chemical sensitivity, light sensitivity, noise sensitivity, smell sensitivity

- d. Wind power electrical substations that require power from an external source (electrical distribution network) must ensure that the power quality of this external source is not affected as this can result in power quality problems for customers connected to the same external power source.
- e. Nearby home owners may need to install power line filters in their homes if levels of dirty electricity remain high.
3. To reduce ground current/voltage, the following steps should be taken:
 - a. A proper neutral system (possibly a five-wire system) should be installed to handle the high-frequency return current in overhead lines (Electric Power Research Institute, 1995).
 - b. Insulators can be placed between the neutral line and the grounding grid for the wind turbine.
 - c. The collection lines from the wind turbine to the substation should be buried if the other techniques to minimize dirty ground current are ineffective.

- d. Local home owners may need to install stray voltage isolators near their transformers until the electric utility can resolve the problem (Hydro One, 2007).

If these steps are taken, improved quality of life and a feeling of wellness may return to some of the people adversely affected by nearby wind turbines.

Conclusions

A subset of the population living near wind turbines is experiencing symptoms of ill health. These symptoms are likely caused by a combination of noise, infrasound, dirty electricity, ground current, and shadow flicker. These frequencies can be highly viable spatially and temporally and are affected by distance; terrain; wind speed and direction; shape, size, and type of dwelling; type of power converters used; state of the electrical distribution line; type and number of grounding systems; and even the type of plumbing in homes. Furthermore, not everyone has the same sensitivity to sound and electromagnetic radiation nor do they have the

same symptoms. The following symptoms seem to be quite common: sleeplessness, fatigue, pain, dizziness, nausea, mood disorders, cognitive difficulties, skin irritations, and tinnitus. To help alleviate symptoms in areas where wind turbines have been erected, remediation is necessary to reduce or eliminate both sound waves and electromagnetic waves. More research is required to help us better understand the relative importance of the various factors contributing to poor health. This type of information will enable a healthy coexistence between wind turbines and the people living nearby.

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Bios

Magda Havas, PhD, is an associate professor at Trent University where she teaches and conducts research on the biological and health effects of electromagnetic and chemical pollutants. She received her BSc and PhD at the University of Toronto and did postdoctoral research at Cornell University on acid rain and aluminum toxicity.

David Colling has applied his electrical engineering studies at Ryerson Polytechnical Institute and his specialized training in electrical pollution to conduct electrical pollution testing for Bio-Ag on farms, homes, and office buildings. Some of the homes tested are located in the environs of industrial wind turbines.

EXHIBIT

2

Attention Deficit Hyperactivity Disorder and Dirty Electricity

To the Editor:

In February 2010, while studying a cancer cluster in teachers at a California elementary school, a fourth-grade teacher complained that her students were hyperactive and unteachable. The classroom levels of high-frequency voltage transients (dirty electricity) in the radio frequencies (RF) between 4 and 100 kHz measured in the outlets of her classroom with a Graham/Stetzer Microsurge meter were very high. Dirty electricity is a term coined by the electrical utilities to describe electrical pollution contaminating the 60 Hz electricity on the electrical grid. A cell phone tower on campus a few feet from this classroom and unshielded fluorescent lights both contributed to the electrical pollution in this room. Cell tower transmitters, like most modern electrical equipment, operate on direct current. The electrical current brought to the tower is alternating current that needs to be changed to direct current. This is done by a switching power supply. These devices interrupt the alternating current and are the likely major source of the dirty electricity in the classroom.

On a Friday afternoon after school, I filtered the 5 outlets in this room with Graham/Stetzer plug-in capacitive filters, reducing the measured

dirty electricity in the room wiring from more than 5000 Graham/Stetzer units to less than 50 units. With no change in either the lighting or the cell tower radiation, the teacher reported an immediate dramatic improvement in the behavior of her students in the following week. They were calmer, paid more attention, and were teachable all week except for Wednesday when they spent part of the day in the library.

In his 1973 book, *Health and Light*,¹ John N. Ott described a 1973 study of 4 first-grade classrooms in a windowless Sarasota, Florida school. Two of the rooms had standard white fluorescent lighting and the other two had full-spectrum fluorescent lighting with a grounded aluminum wire screen to remove the RF radiation produced by fluorescent bulbs and ballasts. Concealed time-lapse cameras recorded student behavior in classrooms for 4 months.² In the unshielded rooms, the first graders developed, "... nervous fatigue, irritability, lapses of attention, and hyperactive behavior." "... students could be observed fidgeting to an extreme degree, leaping from their seats, flailing their arms, and paying little attention to their teachers." In the RF-shielded rooms, "Behavior was entirely different. Youngsters were calmer and far more interested in their work."

The Old Order Amish live without electricity. A pediatric group prac-

tice in Jasper, Indiana, which cares for more than 800 Amish families has not diagnosed a single child with attention deficit hyperactivity disorder (ADHD).³ Dozens of cases of childhood ADHD have been "cured" with no further need for drugs by simply changing their electrical environments (Stetzer D, personal communication [www.Stetzerelectric.com]).

AQ:A

Before children are treated with drugs for ADHD, the dirty electricity levels in their homes and school environments should first be examined and reduced if needed.

I present the epidemiologic evidence linking dirty electricity to the other diseases of civilization in a recent book.^{4,5}

AQ:B

Disclosure: The authors declare no conflict of interest.

AQ:C

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AQ:D

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AQ:E

AQ:F

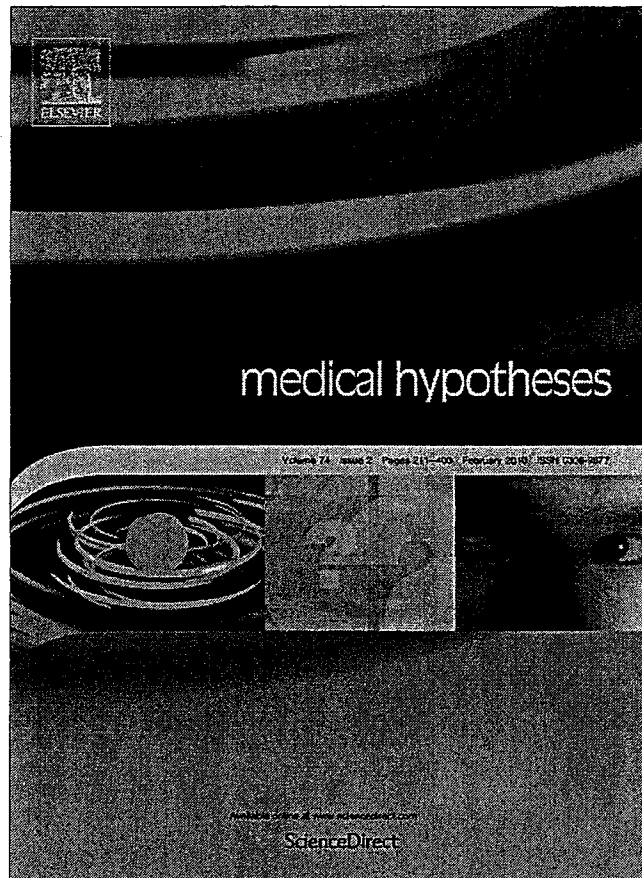
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EXHIBIT

3

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Historical evidence that electrification caused the 20th century epidemic of “diseases of civilization”[☆]

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SUMMARY

The slow spread of residential electrification in the US in the first half of the 20th century from urban to rural areas resulted by 1940 in two large populations; urban populations, with nearly complete electrification and rural populations exposed to varying levels of electrification depending on the progress of electrification in their state. It took until 1956 for US farms to reach urban and rural non-farm electrification levels. Both populations were covered by the US vital registration system. US vital statistics tabulations and census records for 1920–1960, and historical US vital statistics documents were examined. Residential electrification data was available in the US census of population for 1930, 1940 and 1950. Crude urban and rural death rates were calculated, and death rates by state were correlated with electrification rates by state for urban and rural areas for 1940 white resident deaths. Urban death rates were much higher than rural rates for cardiovascular diseases, malignant diseases, diabetes and suicide in 1940. Rural death rates were significantly correlated with level of residential electric service by state for most causes examined. I hypothesize that the 20th century epidemic of the so called diseases of civilization including cardiovascular disease, cancer and diabetes and suicide was caused by electrification not by lifestyle. A large proportion of these diseases may therefore be preventable.

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Background

In 2001, Ossiander and I [1] presented evidence that the childhood leukemia mortality peak at ages 2–4 which emerged in the US in the 1930s was correlated with the spread of residential electrification in the first half of the 20th century in the US. While doing the childhood leukemia study, I noticed a strong positive correlation between level of residential electrification and the death rate by state due to some adult cancers in 1930 and 1940 vital statistics. At the time, a plausible electrical exposure agent and a method for its delivery within residences was lacking. However, in 2008 I coauthored a study of a cancer cluster in school teachers at a California middle school [2] which indicated that high frequency voltage transients (also known as dirty electricity), were a potent universal carcinogen with cancer risks over 10.0 and significant dose-response for a number of cancers. They have frequencies between 2 and 100 kHz. These findings are supported by a large cancer incidence study in 200,000 California school employees which showed that the same cancers and others were in excess in California teachers statewide [3]. Power frequency

magnetic fields (60 Hz) measured at the school were low and not related to cancer incidence, while classroom levels of high frequency voltage transients measured at the electrical outlets in the classrooms accurately predicted a teacher's cancer risk. These fields are potentially present in all wires carrying electricity and are an important component of ground currents returning to substations especially in rural areas. This helped explain the fact that professional and office workers, like the school teachers, have high cancer incidence rates. It also explained why indoor workers had higher malignant melanoma rates, why melanoma occurred on part of the body which never are exposed to sunlight, and why melanoma rates are increasing while the amount of sunshine reaching earth is stable or decreasing due to air pollution. A number of very different types of cancer had elevated risk in the La Quinta school study, in the California school employees study, and in other teacher studies. The only other carcinogenic agent which acts like this is ionizing radiation.

Among the many devices which generate the dirty electricity are compact fluorescent light bulbs, halogen lamps, wireless routers, dimmer switches, and other devices using switching power supplies. Any device which interrupts current flow generates dirty electricity. Arcing, sparking and bad electrical connections can also generate the high frequency voltage transients. Except for the dimmer switches, most of these devices did not exist in the first half of the 20th century. However, early electric generating equipment

[☆] Supported by a small grant from Children with Leukemia.

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and electric motors used commutators, carbon brushes, and split rings, which would inject high frequency voltage transients into the 60 Hz electricity being generated and distributed.

With a newly recognized electrical exposure agent and a means for its delivery, I decided to examine whether residential electrification in the US in the first half of the last century was related to any other causes of death. Most cancers showed increasing mortality in this period, and many are still increasing in incidence in the developed world.

Thomas Edison began electrifying New York City in 1880, but by 1920, only 34.7% of all US dwelling units and 1.6% of farms had electric service (Table 1). By 1940, 78% of all dwelling units and 32% of farms had electric service [4]. This means that in 1940 about three quarters of the US population lived in electrified residences and one quarter did not. By 1940, the US vital registration system was essentially complete, in that all the 48 contiguous United States were included. Most large US cities were electrified by the turn of the century, and by 1940, over 90% of all the residences in the northeastern states and California were electrified. In 1940 almost all urban residents in the US were exposed to electromagnetic fields (EMFs) in their residences and at work, while rural residents were exposed to varying levels of EMFs, depending on the progress of rural electrification in their states. In 1940, only 28% of residences in Mississippi were electrified, and five other southern states had less than 50% of residences electrified (Table 2). Eleven states, mostly in the northeast had residential electrification rates above 90%. In the highly electrified northeastern states and in California, urban and rural residents could have similar levels of EMF exposure, while in states with low levels of residential electrification, there were potentially great differences in EMF exposure between urban and rural residents. It took the first half of the 20th century for these differences to disappear. I examined US mortality records by urban and rural residence by percent of residences with electric service by state.

Hypothesis

The diseases of civilization or lifestyle diseases include cardiovascular disease, cancer and diabetes and are thought to be caused by changes in diet, exercise habits, and lifestyle which occur as countries industrialize. I think the critical variable which causes the radical changes in mortality accompanying industrialization is electrification. Beginning in 1979, with the work of Wertheimer and Leeper [5], there has been increasing evidence that some facet of electromagnetic field exposure is associated epidemiologically with an increased incidence of leukemia, certain other cancers and non-cancers like Alzheimer's disease, amyotrophic lateral sclerosis, and suicide. With the exception of a small part of the electromagnetic spectrum from infra red through visible light, ultraviolet light and cosmic rays, the rest of the spectrum is man-made and foreign to human evolutionary experience. I suggest that from

Table 1
Growth of residential electric service US 1920–1956 percent of dwelling units with electric service.

Year	All		Urban and rural non-farm
	Dwellings	Farm	
1920	34.7	1.6	47.4
1925	53.2	3.9	69.4
1930	68.2	10.4	84.8
1935	68.0	12.6	83.9
1940	78.7	32.6	90.8
1945	85.0	48.0	93.0
1950	94.0	77.7	96.6
1956	98.8	95.9	99.2

Table 2
Percent of residences with electric lighting 1930 and 1940 by state.

Code	State	1930	1940
AL	Alabama	33.9	43.3
AZ	Arizona	68.8	70.5
AR	Arkansas	25.3	32.8
CA	California	93.9	96
CO	Colorado	69.6	77.6
CT	Connecticut	95.3	96.5
DE	Delaware	78.4	81.8
FL	Florida	60.9	66.5
GA	Georgia	35.5	46.6
ID	Idaho	64.5	79.1
IL	Illinois	86.1	89.9
IN	Indiana	74.8	84
IA	Iowa	65.6	76.7
KS	Kansas	62	71.5
KY	Kentucky	44.2	54.2
LA	Louisiana	42.2	48.9
ME	Maine	76.1	80.4
MD	Maryland	81.8	85.9
MA	Massachusetts	97.1	97.6
MI	Michigan	84.8	92.1
MN	Minnesota	65.9	75.8
MS	Mississippi	19.4	28.3
MO	Missouri	65.5	70.6
MT	Montana	58.2	70.7
NE	Nebraska	61	70.5
NV	Nevada	76.2	80.8
NH	New Hampshire	84.9	87
NJ	New Jersey	95.8	96.6
NM	New Mexico	39.8	49.2
NY	New York	94.5	96.4
NC	North Carolina	40.8	54.4
ND	North Dakota	41.6	53.8
OH	Ohio	85.2	90.6
OK	Oklahoma	45.3	55.1
OR	Oregon	79.5	85.8
PA	Pennsylvania	89.5	92.3
RI	Rhode Island	97.3	97.7
SC	South Carolina	34.3	46.2
SD	South Dakota	44.4	56.6
TN	Tennessee	42	50.9
TX	Texas	*	59
UT	Utah	88.4	93.9
V	Vermont	71.9	80.2
VA	Virginia	50.5	60.6
WA	Washington	86.3	90.9
WV	West Virginia	63.4	69.1
WI	Wisconsin	74.5	83.9
WY	Wyoming	60	70.9

*No data.

the time that Thomas Edison started his direct current electrical distribution system in the 1880s in New York City until now, when most of the world is electrified, the electricity carried high frequency voltage transients which caused and continue to cause what are considered to be the normal diseases of civilization. Even today, many of these diseases are absent or have very low incidence in places without electricity.

Evaluation of the hypothesis

To evaluate the hypothesis, I examined mortality in US populations with and without residential electrification. Vital statistics tabulations of deaths [6], US census records for 1920–1970 [7], and historical US documents [8,9] were examined in hard copy or downloaded from the internet. The same state residential electrification data used in the childhood leukemia study [1] was used in this study. Crude death rates were calculated by dividing number of deaths by population at risk, and death rates by state were then correlated with electrification rates by state using downloaded software [10]. Time trends of death rates for selected causes

of death by state were examined. Most rates were calculated by state for urban and rural residence for whites only in 1940 deaths, since complete racial data was available by urban/rural residence by state for only 13 of 48 states. Data was available for 48 states in the 1940 mortality tabulations. District of Columbia was excluded because it was primarily an urban population. Excel graphing software [11] and "Create a Graph" [12] software was used.

I had hoped to further test this hypothesis by studying mortality in individual US farms with and without electrification, when the 1930 US census 70 year quarantine expired in 2000. Unfortunately, the 1930 US farm census schedules had been destroyed.

Findings

Rural residential electrification did not reach urban levels until 1956 (Table 1). Table 2 shows the level of residential electrification for each state for 1930 and 1940. In 1930 and 1940 only 9.5% and 13%, respectively, of all generated electricity was used in residences. Most electricity was used in commercial and industrial applications.

Figs. 1–4 were copied and scanned from "Vital statistics rates in the United States 1940–1960", by Robert Grove Ph.D. and Alice M. Henzel. This volume was published in 1968. Fig. 1 shows a gradual decline in the all causes death rate from 1900 to 1960 except for a spike caused by the 1918 influenza pandemic. Death rates due to tuberculosis, typhoid fever, diphtheria, dysentery, influenza and pneumonia and measles all fell sharply in this period, and account for most of the decline in the all causes death rate. Figs. 2–4 show that in the same time period when the all causes death rate was declining, all malignant neoplasms (Fig. 2), cardiovascular diseases (Fig. 3), and diabetes (Fig. 4) all had gradually increasing death rates. In 1900, heart disease and cancer were 4th and 8th in a list of 10 leading causes of death. By 1940 heart disease had risen to first and cancer to second place, and have maintained that position ever since. Table 3 shows that for all major causes of death examined, except motor vehicle accidents, there was a sizable urban excess in 1940 deaths. The authors of the extensive 69 page introduction to the 1930 mortality statistics volume noted that the cancer rates for cities were 58.2% higher than those for rural areas. They speculated that some of this excess might have been due to rural residents dying in urban hospitals. In 1940, deaths by place of residence and occurrence are presented in separate volumes. In 1940 only 2.1% of all deaths occurred to residents of one state dying in another state. Most non-resident deaths were residents of other areas of the same state. Table 4 presents correlation coefficients for the relationship between death rates by urban rural areas of each state and the percent of residences in each state with

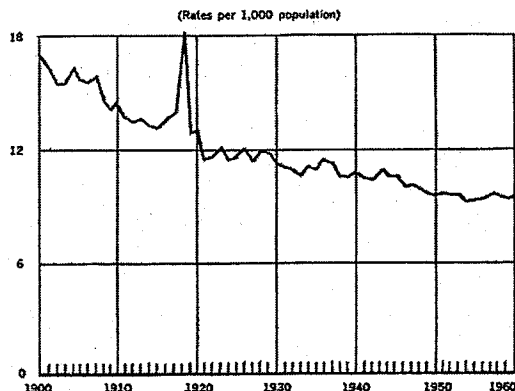


Fig. 1. Death rates: death registration states, 1900–32, and United States, 1933–60.

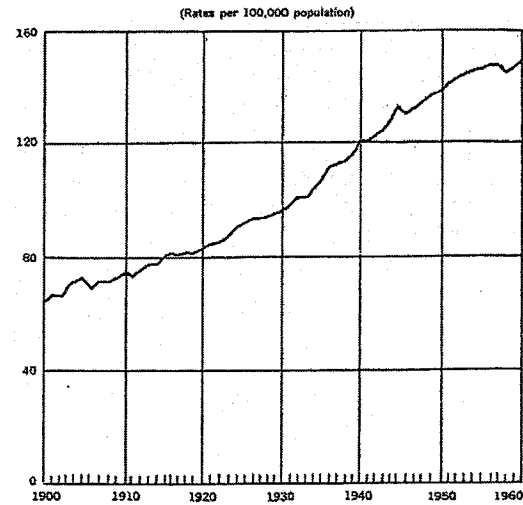


Fig. 2. Death rates for malignant neoplasms: death registration states, 1900–32, and United States, 1933–60.

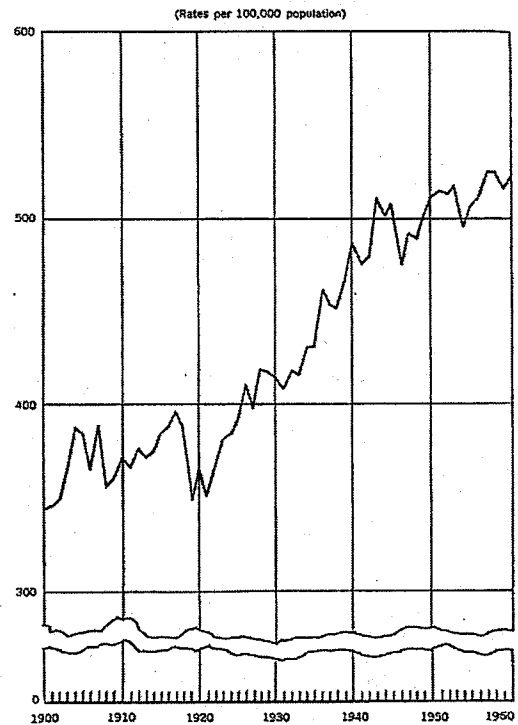


Fig. 3. Death rates for major cardiovascular renal diseases: death registration states, 1900–32, and United States, 1933–60.

electric service. In 1940 urban and rural residence information was not available for individual cancers as it was in 1930, but death rates for each cancer were available by state. They were used to calculate correlations between electric service by state and respiratory cancer, breast cancer and leukemia mortality.

All causes of death

There was no correlation between residential electrification and total death rate for urban areas, but there was a significant

correlation for rural areas ($r = 0.659$, $p = <0.0001$). Fig. 5 shows the 1940 resident white death rates for urban and rural areas of states

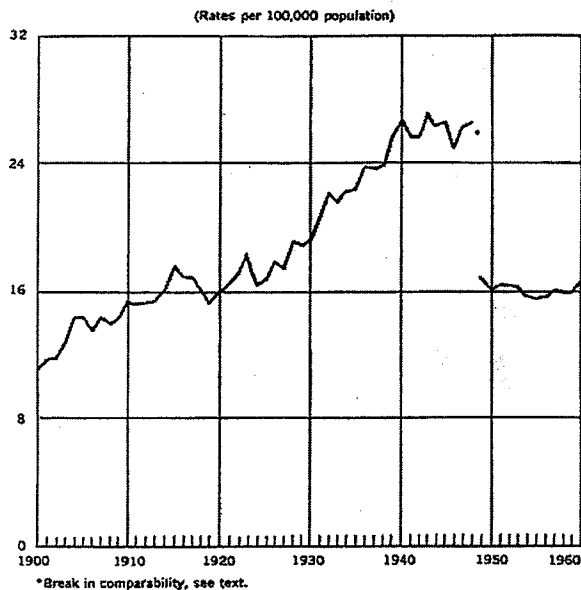


Fig. 4. Death rates for diabetes mellitus: death registration states, 1900–32, and United States, 1933–60.

Table 3
1940 US white resident crude death rates per 100,000 by urban/rural residence.

Cause of death	ICD No. ^a	Urban rate	Rural rate	(%) Urban excess
All	1-200	1124.1	929.5	20.9
All cancers	47-55	145.8	97.7	49.2
Coronary disease	94	92.4	69.1	33.7
Other diseases of heart	90b, 91, 92a, d, e	217.0	162.8	33.3
	93a, b, d, e			
	95a, c			
Diabetes	61	33.2	20.0	66.0
Suicide	163-164	17.1	13.2	29.5
Motor vehicle accidents	170	26.6	26.3	1.1

^a 1938 Revision International classification of disease.

Table 4
Correlation coefficients (r) 1940 crude US death rates by state by electrification for white resident deaths.

Cause	ICD No. ^a	Residence	r	r^2	p One tailed	Slope	Y intercept
All causes	1-200	Urban	0.083	0.007	0.285	0.007	11.114
		Rural	0.659	0.434	<0.0001	0.070	4.185
All cancers	45-55	Urban	0.667	0.445	<0.0001	0.883	75.970
		Rural	0.758	0.575	<0.0001	1.502	-10.040
Respiratory cancer ^b	47	State	0.611	0.374	<0.0001	0.071	1.020
Breast cancer female	50	State	0.794	0.630	<0.0001	0.170	-1.506
Diabetes	61	Urban	0.666	0.444	<0.0001	0.278	8.168
		Rural	0.693	0.480	<0.0001	0.366	-6.184
Leukemia ^b	72a	State	0.375	0.140	0.0042	0.021	1.980
Coronary artery	94	Urban	0.400	0.160	0.0024	0.494	61.570
Disease		Rural	0.781	0.610	<0.0001	1.252	25.319
Other diseases of the heart	90b, 91	Urban	0.449	0.202	0.0006	1.236	100.35
	92a, d, e	Rural	0.799	0.639	0.0001	2.887	-48.989
	93a, b, d, e						
	95a, c						
Suicide	163-4	Urban	0.077	0.006	0.2993	0.028	16.235
		Rural	0.729	0.532	<0.0001	0.181	0.299
Motor vehicle	170	Urban	-0.254	0.064	0.0408	-0.171	44.572
Accidents		Rural	0.451	0.203	0.0006	0.195	12.230

^a International classification of diseases 1938 revision.

^b Age adjusted death rate both sexes.

having greater than 96% of residences electrified and states having less than 50% of residences electrified. In the highly electrified states, urban and rural death rates were similar, but in low electrification states, the urban death rates were systematically higher than the rural death rates. The urban death rates were similar in both high and low electrification states.

All malignant neoplasms

In 1940, the urban total cancer rate was 49.2% higher than the rural rate. Both urban and rural cancer deaths rates were significantly correlated with residential electrification. Fig. 6 shows the 1940 resident white total cancer rates for urban and rural areas of states having greater than 96% of residences electrified and states having less than 50% of residences electrified. Four of the five high electrification states had similar urban and rural total cancer rates, while all the low electrification states had urban rates about twice as high as rural rates. Both urban and rural total cancer rates were lower in low electrification states than in high electrification states. Fig. 7 shows the time trend of the total cancer rate between 1920 and 1960 for Massachusetts (1940 electrification rate = 97.6%) and Louisiana (1940 electrification rate = 48.9%). The Massachusetts cancer rate was about twice that of Louisiana between 1920 and 1945. The Massachusetts rate leveled off in 1945, but the Louisiana rate increased steadily between 1920 and 1960. A declining urban–rural gradient for cancer is still evident in 1980–1990 US cancer incidence data [13]. Swedish investigators [14] have reported increasing cancer mortality and incidence time trend breaks in the latter half of the 20th century.

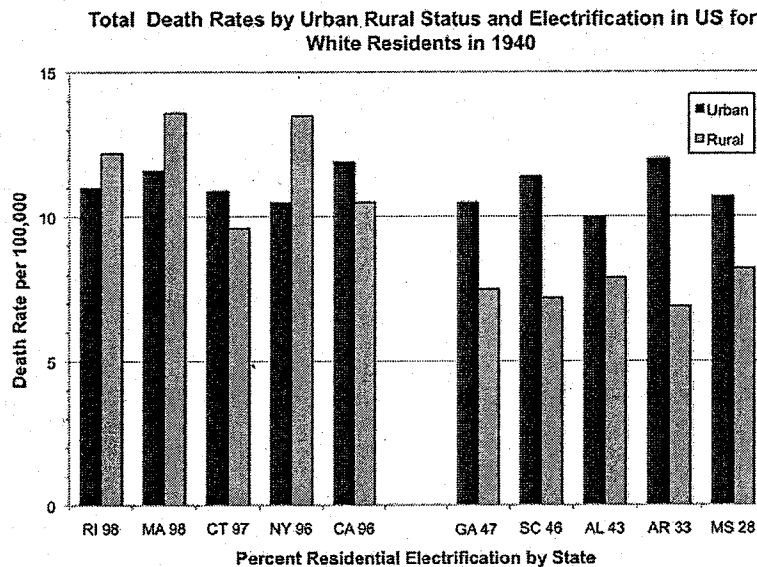


Fig. 5. All causes death rates by urban rural status and electrification in the US for white residents in 1940.

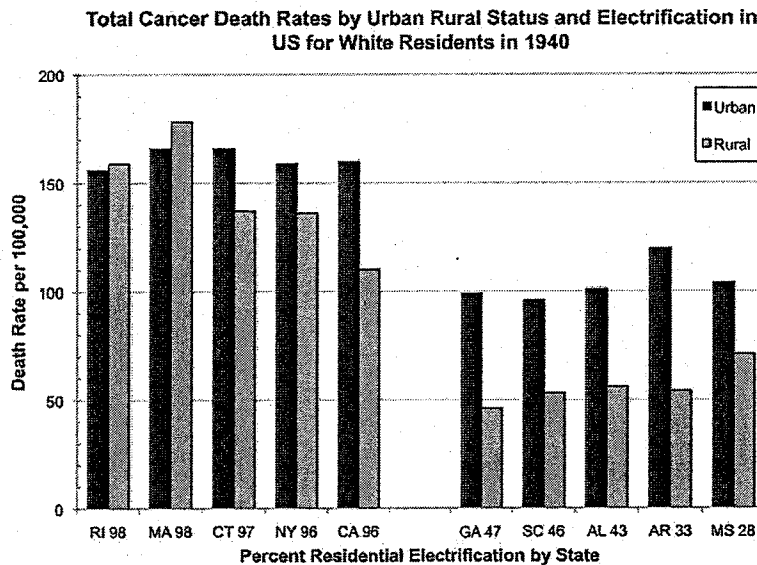


Fig. 6. Total cancer death rates by urban rural status and electrification in the US for white residents in 1940.

Respiratory cancer

No urban rural information was available for respiratory cancer, but the correlation between residential electrification and state death rates was $r = 0.611$; $p < 0.0001$. This cancer is etiologically strongly related to cigarette smoking, so the correlation with electrification is surprising. A large electrical utility worker cohort study found a high respiratory cancer incidence related to high frequency EMF transient exposure independent of cigarette smoking with a significant dose–response relationship [15].

Breast cancer

Although urban/rural information was not available for breast cancer, the 1940 state breast cancer death rates have a correlation

of $r = 0.794$; $p < 0.0001$ with residential electrification. Fig. 8 shows the typical time trend of breast cancer death rates for a state with a high level of electrification (96%) and one with a low level of electrification (<50) in 1940. The California breast cancer death rate increased from 1920 to 1940, and then gradually decreased until 1960. The Tennessee breast cancer death rate is less than half of the California rate in 1920 and continues a steady increase until 1960.

Diabetes

This cause has a 66% urban excess. In spite of this, the correlation coefficients for urban and rural areas are similar at $r = 0.66$; $p < 0.0001$. There is some animal and human evidence that EMFs can effect insulin production and blood glucose levels [16]. Fig. 9

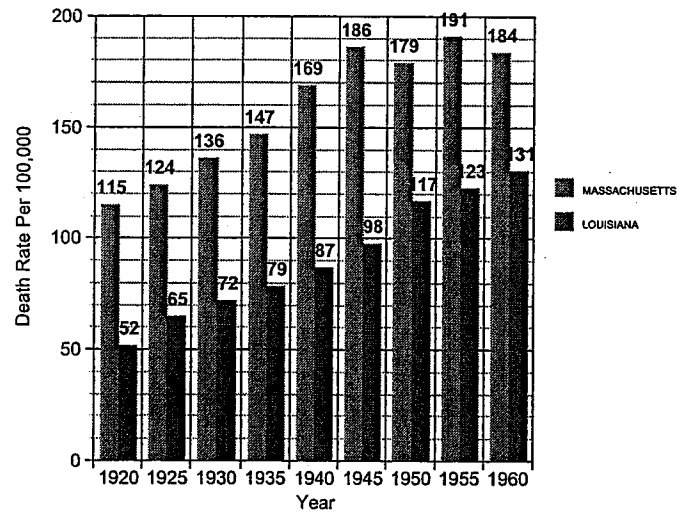


Fig. 7. US white resident total cancer death rates for Massachusetts (97.6% elect.) and Louisiana (48.9% elect.) by year.

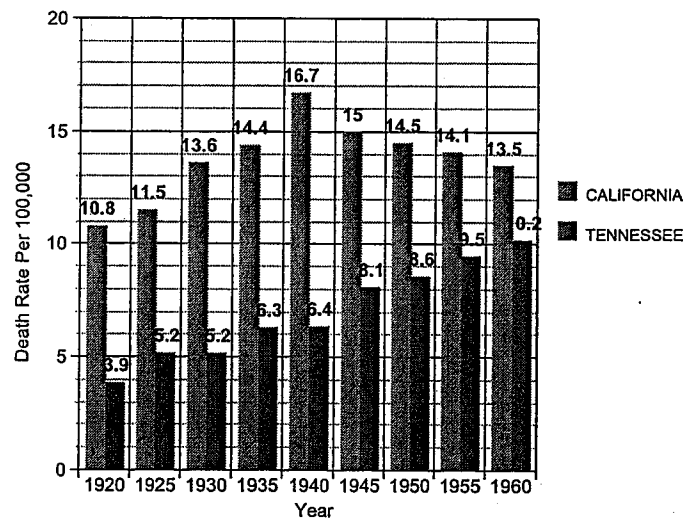


Fig. 8. US white resident breast cancer death rates for California (96% elect.) and Tennessee (50% elect.) by year.

shows that in states with low levels of electrification in 1940, the urban diabetes death rates are consistently higher than the rural rates, but are always lower than the urban and rural rates in the high electrification states.

Leukemia

Since the childhood leukemia age peak is strongly associated with residential electrification, it was interesting that the all leukemia death rate correlation was $r = 0.375$; $p = 0.0042$. Most of these deaths are in adults and are of different types of leukemia. A study of amateur radio operators showed a selective excess only of acute myelogenous leukemia [17].

Coronary artery disease and other heart disease

These two cause groups had the same percentage urban excess (33%), and very similar patterns of urban and rural correlation

coefficients with residential electrification. The urban correlations were about $r = 0.4$ and rural deaths had correlations of 0.78 and 0.79, respectively. Fig. 10 shows the 1940 resident white coronary artery disease death rates for urban and rural areas of states having greater than 96% of residences electrified and states having less than 50% of residences electrified. Four of the five high electrification states had similar urban and rural total cancer rates, while all the low electrification states had urban rates about twice as high as rural rates. Urban and rural coronary artery death rates were lower in low electrification states than in high electrification states.

Suicide

The urban suicide death rate is about 30% higher than the rural rate. The urban suicide rate is not correlated with residential electrification ($r = 0.077$; $p = 0.299$), but the rural death rate is correlated with 1940 state residential electrification levels ($r = 0.729$; $p < 0.0001$). Fig. 11 shows the 1940 resident white suicide for

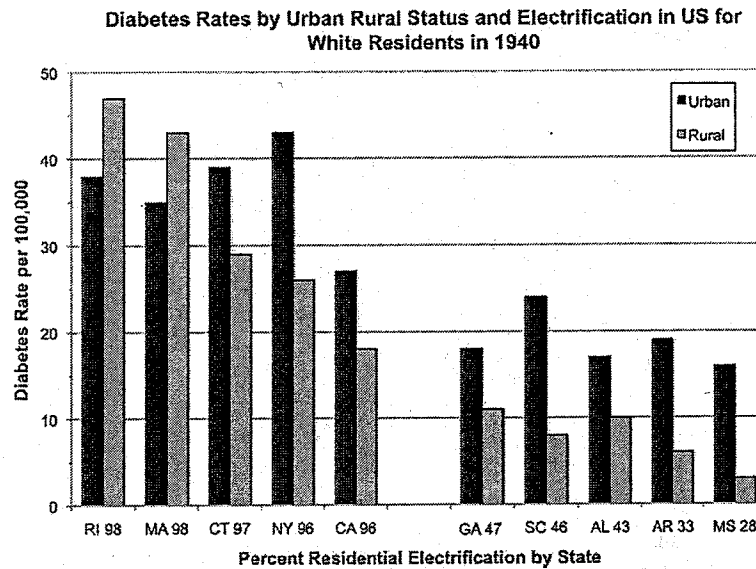


Fig. 9. Total diabetes rates by urban rural status and electrification in the US for white residents in 1940.

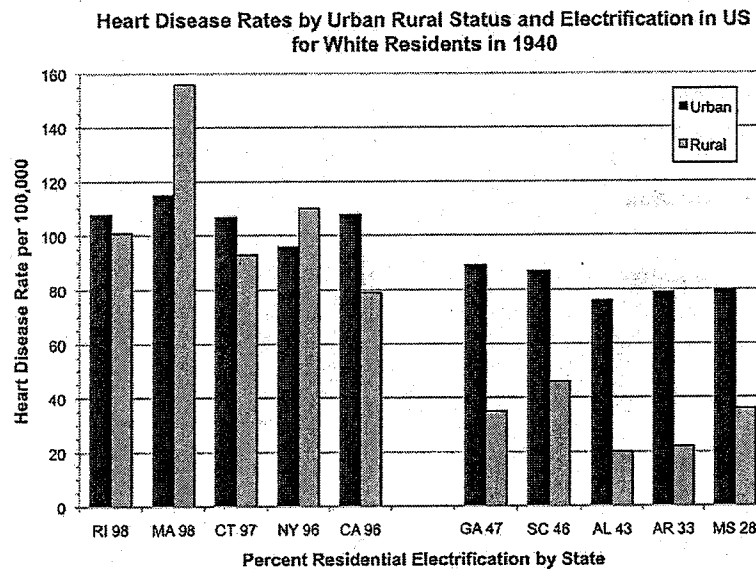


Fig. 10. Total heart disease rates by urban rural status and electrification in the US for white residents in 1940.

urban and rural areas of states having greater than 96% of residences electrified and states having less than 50% of residences electrified. In four of five high electrification states, rural suicide rates are higher than the urban rates. In all of the low electrification states, the urban rate is higher. The rural rates in the high electrification states are higher than the rural rates in the low electrification states. Fig. 12 shows X Y scatter plots for urban and rural suicide by electrification for 48 states. Suicide has been associated with both residential [18] and occupational [19] EMF exposure. Suicide is probably the visible peak of the clinical depression iceberg.

Motor vehicle accidents

Although the mortality rates are similar in urban and rural areas, the correlations with residential electrification levels are dif-

ferent. There is a slight negative correlation ($r = -0.254$) in urban areas and a positive correlation ($r = 0.451$) in rural areas. Since motor vehicle fatality is related to access to a vehicle and to speed. It may be that in the larger cities it was difficult to go fast enough for a fatal accident, and in rural areas especially on farms, a farmer who could afford electrification could also afford a car.

Discussion

When Edison and Tesla opened the Pandora's box of electrification in the 1880s, the US vital registration system was primitive at best, and infectious disease death rates were falling rapidly. City residents had higher mortality rates and shorter life expectancy than rural residents [8]. Rural white males in 1900 had an expectation of life at birth of over 10 years longer than urban residents.

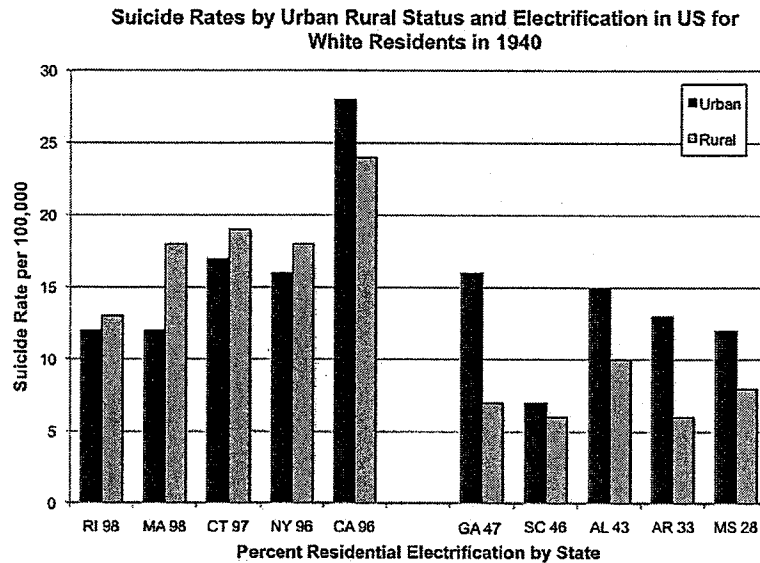


Fig. 11. Total suicide death rates by urban rural status and electrification in the US for white residents in 1940.

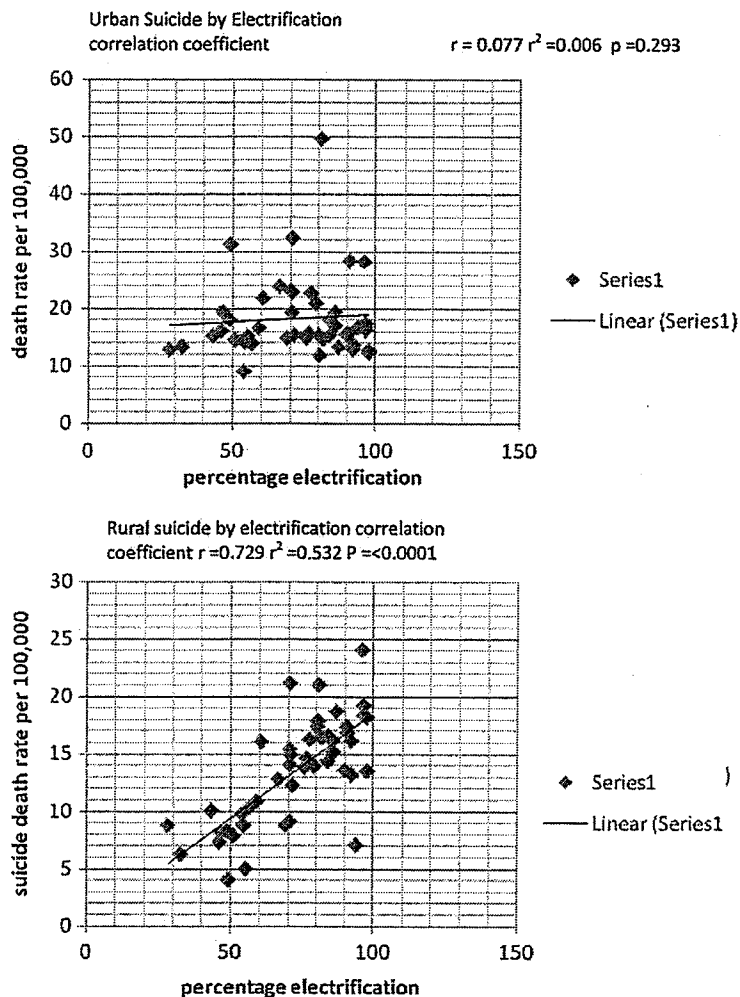


Fig. 12. 1940 US white resident urban rural suicide death rates by state and electrification.

Although the authors of the 1930 US vital statistics report noted a 58.2% cancer mortality excess in urban areas, it raised no red flags. The census bureau residential electrification data was obviously not linked to the mortality data. Epidemiologists in that era were still concerned with the communicable diseases.

Court Brown and Doll reported [20] the appearance of the childhood leukemia age peak in 1961, forty years after the US vital statistics mortality data on which it was based was available. I reported a cluster of childhood leukemia [21] a decade after it occurred, only because I looked for it. Real time or periodic analysis of national or regional vital statistics data is still only rarely done in the US.

The real surprise in this data set is that cardiovascular disease, diabetes and suicide, as well as cancer seem to be strongly related to level of residential electrification. A community-based epidemiologic study of urban rural differences in coronary heart disease and its risk factors was carried out in the mid 1980s in New Delhi, India and in a rural area 50 km away [22]. The prevalence of coronary heart disease was three times higher in the urban residents, despite the fact that the rural residents smoked more and had higher total caloric and saturated fat intakes. Most cardiovascular disease risk factors were two to three times more common in the urban residents. Rural electrification projects are still being carried out in parts of the rural area which was studied.

It seems unbelievable that mortality differences of this magnitude could go unexplained for over 70 years after they were first reported and 40 years after they were noticed. I think that in the early part of the 20th century nobody was looking for answers. By the time EMF epidemiology got started in 1979 the entire population was exposed to EMFs. Cohort studies were therefore using EMF-exposed population statistics to compute expected values, and case-control studies were comparing more exposed cases to less exposed controls. The mortality from lung cancer in two pack a day smokers is over 20 times that of non-smokers but only three times that of one pack a day smokers. After 1956, the EMF equivalent of a non-smoker ceased to exist in the US. An exception to this is the Amish who live without electricity. Like rural US residents in the 1940s, Amish males in the 1970s had very low cancer and cardiovascular disease mortality rates [23].

If this hypothesis and findings outlined here are even partially true, the explosive recent increase in radiofrequency radiation, and high frequency voltage transients sources, especially in urban areas from cell phones and towers, terrestrial antennas, wi-fi and wi-max systems, broadband internet over power lines, and personal electronic equipment, suggests that like the 20th century EMF epidemic, we may already have a 21st century epidemic of morbidity and mortality underway caused by electromagnetic fields. The good news is that many of these diseases may be preventable by environmental manipulation, if society chooses to.

Conflicts of interest statement

None declared.

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EXHIBIT

4

A New Electromagnetic Exposure Metric: High Frequency Voltage Transients Associated With Increased Cancer Incidence in Teachers in a California School

Samuel Milham, MD, MPH^{*,†} and L. Lloyd Morgan, BS[‡]

Background In 2003 the teachers at La Quinta, California middle school complained that they had more cancers than would be expected. A consultant for the school district denied that there was a problem.

Objectives To investigate the cancer incidence in the teachers, and its cause.

Method We conducted a retrospective study of cancer incidence in the teachers' cohort in relationship to the school's electrical environment.

Results Sixteen school teachers in a cohort of 137 teachers hired in 1988 through 2005 were diagnosed with 18 cancers. The observed to expected (O/E) risk ratio for all cancers was 2.78 ($P = 0.000098$), while the O/E risk ratio for malignant melanoma was 9.8 ($P = 0.0008$). Thyroid cancer had a risk ratio of 13.3 ($P = 0.0098$), and uterine cancer had a risk ratio of 9.2 ($P = 0.019$). Sixty Hertz magnetic fields showed no association with cancer incidence. A new exposure metric, high frequency voltage transients, did show a positive correlation to cancer incidence. A cohort cancer incidence analysis of the teacher population showed a positive trend ($P = 7.1 \times 10^{-10}$) of increasing cancer risk with increasing cumulative exposure to high frequency voltage transients on the classroom's electrical wiring measured with a Graham/Stetzer (G/S) meter. The attributable risk of cancer associated with this exposure was 64%. A single year of employment at this school increased a teacher's cancer risk by 21%.

Conclusion The cancer incidence in the teachers at this school is unusually high and is strongly associated with high frequency voltage transients, which may be a universal carcinogen, similar to ionizing radiation. Am. J. Ind. Med. 2008. © 2008 Wiley-Liss, Inc.

KEY WORDS: high frequency voltage transients; electricity; dirty power; cancer; school teachers; carcinogen

Abbreviations: EMF, electromagnetic fields; O, observed cases; E, expected cases; O/E, risk ratio; p, probability; Hz, Hertz or cycles per second; OSHA, Occupational Safety and Health Administration; OCMAP, occupational mortality analysis program; AM, amplitude modulation; GS units, Graham/Stetzer units; G/S meter, Graham/Stetzer meter; MS II, Microsurge II meter; mG, milligauss; EKG, electrocardiogram; LQMS, La Quinta Middle School.

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BACKGROUND

Since the 1979 Wertheimer–Leeper study [Wertheimer and Leeper, 1979] there has been concern that exposure to power frequency (50/60 Hz) EMFs, especially magnetic fields, may contribute to adverse health effects including cancer. Until now, the most commonly used exposure metric has been the time-weighted average of the power-frequency magnetic field. However, the low risk ratios in most studies suggest that magnetic fields might be a surrogate for a more important metric. In this paper we present evidence that a

new exposure metric, high frequency voltage transients existing on electrical power wiring, is an important predictor of cancer incidence in an exposed population.

The new metric, GS units, used in this investigation is measured with a Graham/Stetzer meter (G/S meter) also known as a Microsurge II meter (MS II meter), which is plugged into electric outlets [Graham, 2005]. This meter displays the average rate of change of these high frequency voltage transients that exist everywhere on electric power wiring. High frequency voltage transients found on electrical wiring both inside and outside of buildings are caused by an interruption of electrical current flow. The electrical utility industry has referred to these transients as "dirty power."

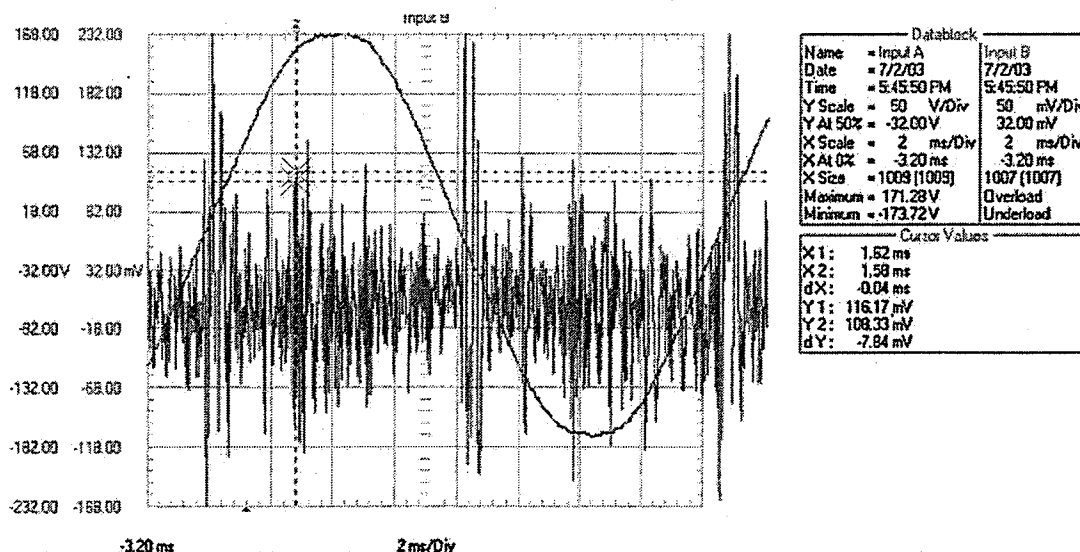
There are many sources of "dirty power" in today's electrical equipment. Examples of electrical equipment designed to operate with interrupted current flow are light dimmer switches that interrupt the current twice per cycle (120 times/s), power saving compact fluorescent lights that interrupt the current at least 20,000 times/s, halogen lamps, electronic transformers and most electronic equipment manufactured since the mid-1980s that use switching power supplies. Dirty power generated by electrical equipment in a building is distributed throughout the building on the electric wiring. Dirty power generated outside the building enters the building on electric wiring and through ground rods and

conductive plumbing, while within buildings, it is usually the result of interrupted current generated by electrical appliances and equipment.

Each interruption of current flow results in a voltage spike described by the equation $V = L \times di/dt$, where V is the voltage, L is the inductance of the electrical wiring circuit and di/dt is the rate of change of the interrupted current. The voltage spike decays in an oscillatory manner. The oscillation frequency is the resonant frequency of the electrical circuit. The G/S meter measures the average magnitude of the rate of change of voltage as a function of time (dV/dT). This preferentially measures the higher frequency transients. The measurements of dV/dT read by the meter are defined as GS (Graham/Stetzer) units.

The bandwidth of the G/S meter is in the frequency range of these decaying oscillations. Figure 1 shows a two-channel oscilloscope display. One channel displays the 60 Hz voltage on an electrical outlet while the other channel with a 10 kHz hi-pass filter between the oscilloscope and the electrical outlet, displays the high frequency voltage transients on the same electrical outlet [Havas and Stetzer, 2004, reproduced with permission].

Although no other published studies have measured high frequency voltage transients and risk of cancer, one study of electric utility workers exposed to transients from pulsed



THE WAVEFORM WAS COLLECTED IN ROOM 114 AT THE ELGIN/MILLVILLE MN HIGH SCHOOL. CHANNEL 1 WAS CONNECTED TO THE 120 VAC UTILITY SUPPLIED POWER RECEPTACLE. CHANNEL 2 WAS CONNECTED TO THE SAME POTENTIAL, EXCEPT THROUGH THE GRAHAM UBIQUITOUS FILTER. (REMOVES THE 60 HERTZ) THE AREA BETWEEN THE CURSORS REPRESENTS A FREQUENCY OF 25 KILO HERTZ. A TEACHER WHO PREVIOUSLY OCCUPIED THE ROOM DIED OF BRAIN TUMORS AND THE TEACHER IN THE ADJOINING ROOM DIED OF LUEKEMIA.

FIGURE 1. Oscilloscope display of dirty power: 60 Hz electrical power (channel 1) with concurrent high frequency voltage transients (channel 2). A 10 kHz hi-pass filter was used on channel 2 in order to filter out the 60 Hz voltage and its harmonics. [Color figure can be viewed in the online issue, which is available at www.interscience.wiley.com.]

electromagnetic fields found an increased incidence of lung cancer among exposed workers [Armstrong et al., 1994].

INTRODUCTION

In February 2004, a Palm Springs, California newspaper, *The Desert Sun*, printed an article titled, "Specialist discounts cancer cluster at school," in which a local tumor registry epidemiologist claimed that there was no cancer cluster or increased cancer incidence at the school [Perrault, 2004]. An Internet search revealed that the teacher population at La Quinta Middle School (LQMS) was too small to generate the 11 teachers with cancer who were reported in the article. The school was opened in 1988 with 20 teachers hired that year. For the first 2 years, the school operated in three temporary buildings, one of which remains. In 1990, a newly constructed school opened. In 2003, the teachers complained to school district management that they believed that they had too many cancers. Repeated requests to the school administration for physical access to the school and for teachers' information were denied. We contacted the teachers, and with their help, the cancers in the group were characterized. One teacher suggested using yearbooks to develop population-at-risk counts for calculating expected cancers. We were anxious to assess the electrical environment at the school, since elevated power frequency magnetic field exposure with a positive correlation between duration of exposure and cancer incidence had been reported in first floor office workers who worked in strong magnetic fields above three basement-mounted 12,000 V transformers [Milham, 1996]. We also wanted to use a new electrical measurement tool, the Graham/Stetzer meter, which measures high frequency voltage transients.

The Graham/Stetzer Microsurge II meter measures the average rate of change of the transients in Graham/Stetzer units (GS units). Anecdotal reports had linked dirty power exposure with a number of illnesses [Havas and Stetzer, 2004]. We decided to investigate whether power frequency magnetic field exposure or dirty power exposure could explain the cancer increase in the school teachers.

METHODS

After the school administration (Desert Sands Unified School District) had refused a number of requests to assist in helping us evaluate the cancers reported by the teachers, we were invited by a teacher to visit the school after hours to make magnetic field and dirty power measurements. During that visit, we noted that, with the exception of one classroom near the electrical service room, the classroom magnetic field levels were uniformly low, but the dirty power levels were very high, giving many overload readings. When we reported this to Dr. Doris Wilson, then the superintendent of schools (retired December, 2007), one of us (SM) was threatened

with prosecution for "unlawful.. trespass," and the teacher who had invited us into the school received a letter of reprimand. The teachers then filed a California OSHA complaint which ultimately lead to a thorough measurement of magnetic fields and dirty power levels at the school by the California Department of Health Services which provided the exposure data for this study. They also provided comparison dirty power data from residences and an office building, and expedited tumor registry confirmation of cancer cases.

Classrooms were measured at different times using 3 meters: an FW Bell model 4080 tri-axial Gaussmeter, a Dexsil 310 Gaussmeter, and a Graham-Stetzer (G/S) meter. The Bell meter measures magnetic fields between 25 and 1,000 Hz. The Dexsil meter measures magnetic fields between 30 and 300 Hz. The G/S meter measures the average rate of change of the high frequency voltage transients between 4 and 150 KHz.

All measurements of high frequency voltage transients were made with the G/S meter. This meter was plugged into outlets, and a liquid crystal display was read. All measurements reported were in GS units. The average value was reported where more than one measurement was made in a classroom.

We measured seven classrooms in February 2005 using the Bell meter and the G/S meter. Later in 2005, the teachers measured 37 rooms using the same meters. On June 8, 2006, electrical consultants for the school district and the California Department of Health Services (Dr. Raymond Neutra) repeated the survey using the G/S meter and a Dexsil 320 Gaussmeter, measuring 51 rooms. We used results of this June 8, 2006 sampling in our exposure calculations, since all classrooms were sampled, multiple outlets per room were sampled, and an experienced team did the sampling. Additionally, GS readings were taken at Griffin Elementary school near Olympia, Washington, and Dr. Raymond Neutra provided GS readings for his Richmond California office building and 125 private California residences measured in another Northern California study.

All the cancer case information was developed by personal, telephone, and E-mail contact with the teachers or their families without any assistance from the school district. The local tumor registry verified all the cancer cases with the exception of one case diagnosed out of state and the two cases reported in 2007. The out-of state case was verified by pathologic information provided by the treating hospital. The teachers gathered population-at-risk information (age at hire, year of hire, vital status, date of diagnosis, date of death, and termination year) from yearbooks and from personal contact. The teachers also provided a history of classroom assignments for all teachers from annual classroom assignment rosters (academic years 1990–1991 to 2006–2007) generated by the school administration. The school administration provided a listing of school employees, including

the teachers, to the regional tumor registry after the teachers involved the state health agency by submitting an OSHA complaint. The information we obtained anecdotally from the teachers, yearbooks, and classroom assignment rosters was nearly identical to that given to the tumor registry. None of the cancer cases were ascertained initially through the cancer registry search.

Published cancer incidence rates by age, sex, and race for all cancers, as well as for malignant melanoma, thyroid, uterine, breast, colon, ovarian cancers, and non-Hodgkin's lymphoma (NHL) were obtained from a California Cancer Registry publication [Kwong et al., 2001]. We estimated the expected cancer rate for each teacher by applying year, age, sex, and race-specific cancer incidence rates from hire date until June 2007, or until death. We then summed each teacher's expected cancer rate for the total cohort.

Using the California cancer incidence data, the school teacher data, and the GS exposure data, we calculated cancer incidence and risks. A replicate data set was sent to Dr. Gary Marsh and to Mike Cunningham at the University of Pittsburgh School of Public Health for independent analysis using OCMAP software. We calculated cancer risk ratios by duration of employment and by cumulative GS unit-years of exposure. We calculated an attributable risk percent using the frequencies of total observed and expected cancers, and performed trend tests [Breslow and Day, 1987] for cancer risk versus duration of employment and cumulative GS unit-years of exposure. Poisson *P* values were calculated using the Stat Trek website (Stat Trek, 2007). We also performed a linear regression of cancer risk by duration of employment in years and by time-weighted exposure in GS unit-years.

Since neither author had a current institutional affiliation, institutional review board approval was not possible. The teachers requested the study, and their participation in the study was both voluntary and complete. All the active teachers at the school signed the Cal OSHA request. The authors fully explained the nature of the study to study participants and offered no remuneration to the teachers for participation in the study. The authors maintained strict confidentiality of all medical and personal information provided to us by the teachers, and removed personal identifiers from the data set which was analyzed by the University of Pittsburgh. Possession of personal medical

information was limited to the two authors. No patient-specific information was obtained from the tumor registry. With the individual's permission we provided the registry with case information for a teacher with malignant melanoma diagnosed out of state. The exposure information was provided by the California Department of Health Services. The basic findings of the study were presented to the Desert Sands Unified School District School Board and at a public meeting arranged by the teachers.

RESULTS

Electrical Measurements

In our seven-room survey of the school in 2005, magnetic field readings were as high as 177 mG in a classroom adjacent to the electrical service room. A number of outlets had overload readings with the G/S meter. Magnetic fields were not elevated (>3.0 mG) in the interior space of any of the classrooms except in the classroom adjacent to the electrical service room, and near classroom electrical appliances such as overhead transparency projectors. There was no association between the risk of cancer and 60 Hz magnetic field exposures in this cohort, since the classroom magnetic field exposures were the same for teachers with and without cancer (results not shown).

This school had very high GS readings and an association between high frequency voltage transient exposure in the teachers and risk of cancer. The G/S meter gives readings in the range from 0 to 1,999 GS units. The case school had 13 of 51 measured rooms with at least one electrical outlet measuring "overload" ($\geq 2,000$ GS units). These readings were high compared to another school near Olympia Washington, a Richmond California office building, and private residences in Northern California (Table I). Altogether, 631 rooms were surveyed for this study. Only 17 (2.69%) of the 631 rooms had an "overload" (maximum, $\geq 2,000$ GS units) reading. Applying this percentage to the 51 rooms surveyed at the case school, we would expect 1.4 rooms at the school to have overload GS readings ($0.0269 \times 51 = 1.37$). However, thirteen rooms (25%) measured at the case school had "overload" measurements above the highest value (1,999 GS units) that the G/S meter can

TABLE I. Graham/Stetzer Meter Readings: Median Values in Schools, Homes and an Office Building

Place	Homes	Office bldg	Olympia WA School	LQMS	Total
No. of rooms surveyed	500	39	41	51	531
Median GS units	159	210	160	750	$<270^a$
Rooms with overload GS units ($\geq 2,000$)	4	0	0	13*	17

^aExcludes homes as specific room data was not available.

* $P = 3.14 \times 10^{-9}$.

TABLE II. Risk of Cancer by Type Among Teachers at La Quinta Middle School

Cancer	Observed	Expected	Risk ratio (O/E)	P-value
All cancers	18	6.51	2.78*	0.000098
Malignant melanoma	4	0.41	9.76*	0.0008
Thyroid cancer	2	0.15	13.3*	0.011
Uterus cancer	2	0.22	9.19*	0.019
Female breast cancer	2	1.5	1.34	0.24
All cancers less melanoma	14	6.10	2.30*	0.0025

* $P \leq 0.05$.

measure. This is a highly statistically significant excess over expectation (Poisson $P = 3.14 \times 10^{-9}$).

We noticed AM radio interference in the vicinity of the school. A teacher also reported similar radio interference in his classroom and in the field near his ground floor classroom. In May 2007, he reported that 11 of 15 outlets in his classroom overloaded the G/S meter. An AM radio tuned off station is a sensitive detector of dirty power, giving a loud buzzing noise in the presence of dirty power sources even though the AM band is beyond the bandwidth of the G/S meter.

Cancer Incidence

Three more teachers were diagnosed with cancer in 2005 after the first 11 cancer diagnoses were reported, and another former teacher (diagnosed out-of-state in 2000) was reported by a family member employed in the school system. One cancer was diagnosed in 2006 and two more in 2007. In the years 1988–2005, 137 teachers were employed at the school. The 18 cancers in the 16 teachers were: 4 malignant melanomas, 2 female breast cancers, 2 cancers of the thyroid, 2 uterine cancers and one each of Burkitt's lymphoma (a type of non-Hodgkins lymphoma), polycythemia vera, multiple myeloma, leiomyosarcoma and cancer of the colon, pancreas, ovary and larynx. Two teachers had two primary cancers each: malignant melanoma and multiple myeloma, and colon and pancreatic cancer. Four teachers had died of cancer through August 2007. There have been no non-cancer deaths to date.

The teachers' cohort accumulated 1,576 teacher-years of risk between September 1988 and June 2007 based on a 12-month academic year. Average age at hire was 36 years. In 2007, the average age of the cohort was 47.5 years.

When we applied total cancer and specific cancer incidence rates by year, age, sex, race, and adjusted for cohort ageing, we found an estimate of 6.5 expected cancers, 0.41 melanomas, 0.15 thyroid cancers, 0.22 uterine cancers, and 1.5 female breast cancers (Table II). For all cancers, the risk ratio (Observed/Expected = 18/6.5) was 2.78 ($P = 0.000098$, Poisson test); for melanoma, (O/E = 4/0.41) was 9.8 ($P = 0.0008$, Poisson test); for thyroid cancer (O/E = 2/0.15) was 13.3 ($P = 0.0011$, Poisson test); for uterine cancer (O/E = 2/0.22), was 9.19 ($P = 0.019$, Poisson test).

Table III shows the cancer risk among the teachers by duration of employment. Half the teachers worked at the school for less than 3 years (average 1.52 years). The cancer risk increases with duration of employment, as is expected when there is exposure to an occupational carcinogen. The cancer risk ratio rose from 1.7 for less than 3 years, to 2.9 for 3–14 years, to 4.2 for 15+ years of employment. There was a positive trend of increasing cancer incidence with increasing duration of employment ($P = 4.6 \times 10^{-10}$). A single year of employment at this school increases a teacher's risk of cancer by 21%.

Using the June 8, 2006 survey data (Table IV), the cancer risk of a teacher having ever worked in a room with at least one outlet with an overload GS reading (≥ 2000 GS units) and employed for 10 years or more, was 7.1 ($P = 0.00007$, Poisson test). In this group, there were six teachers diagnosed

TABLE III. Cancer Risk by Duration of Employment

Time at school	Average time	Teachers	% of teachers	Cancer observed	Cancer expected	Risk ratio (O/E)	Poisson p
<3 years	1.52 years	68	49.6	4	2.34	1.72	0.12
3–14 years	7.48 years	56	40.9	9	3.14	2.87*	0.0037
15+ years	16.77 years	12	8.8	5	1.02	4.89*	0.0034
Total		137	100	18	6.51	2.78*	0.000098

Positive trend test (Chi square with one degree of freedom = 38.8, $P = 4.61 \times 10^{-10}$).

* $P \leq 0.05$.

TABLE IV. Cancer in Teachers Who Ever Taught in Classrooms With at Least One Overload GS Reading (≥ 2000 GS Units) by Duration of Employment

Ever in a room >2,000 GS units	Employed 10 + years	Total teachers	Cancers observed	Cancers expected	Risk ratio (O/E)	Poisson p
Yes	Yes	10	7 ^a	0.988	7.1*	0.00007
Yes	No	30	3 ^a	0.939	3.2	0.054
Total		40	10	1.93	5.1*	0.00003
No	Yes	19	2	1.28	1.6	0.23
No	No	78	6	3.25	1.8	0.063
Total		97	8	4.56	1.8*	0.047
Grand total		137	18	6.49	2.8*	0.000098

^aOne teacher had two primary cancers.* $P < 0.05$.

with a total of seven cancers, and four teachers without a cancer diagnosis, who were employed for 10 or more years and who ever worked in one of these rooms. Five teachers had one primary cancer and one teacher had two primary cancers. These teachers made up 7.3% of the teachers' population (10/137) but had 7 cancers or 39% (7/18) of the total cancers. The 10 teachers who worked in an overload classroom for 10 years or more had 7 cancers when 0.99 would have been expected ($P = 6.8 \times 10^{-5}$ Poisson test). The risk ratio for the 8 teachers with cancer and 32 teachers without cancer, who ever worked in a room with an overload GS reading, regardless of the time at the school, was 5.1 ($P = 0.00003$, Poisson test). The risk ratio for 8 teachers with cancer and 89 teachers without cancer who never worked in a room with an overload G-S reading was 1.8 ($P = 0.047$, Poisson test). Teachers who never worked in an overload classroom also had a statistically significantly increased risk of cancer.

A positive dose-response was seen between the risk of cancer and the cumulative GS exposure (Table V). Three categories of cumulative GS unit-years of exposure were selected: <5,000, 5,000 to 10,000, and more than 10,000 cumulative GS unit-years. We found elevated risk ratios of 2.0, 5.0, and 4.2, respectively, all statistically significant, for each category. There was a positive trend of increasing cancer

incidence with increasing cumulative GS unit-years of exposure ($P = 7.1 \times 10^{-10}$). An exposure of 1,000 GS unit-years increased a teacher's cancer risk by 13%. Working in a room with a GS overload ($\geq 2,000$ GS units) for 1 year increased cancer risk by 26%.

An attributable risk percentage was calculated: (observed cancers-expected cancers)/observed cancers = $(18-6.51)/18 = 63.8\%$.

The fact that these cancer incidence findings were generated by a single day of G/S meter readings made on June 8, 2006 suggests that the readings were fairly constant over time since the school was built in 1990. For example, if the 13 classrooms which overloaded the meter on June 8, 2006 were not the same since the start of the study and constant throughout, the cancer risk of teachers who ever worked in the overload rooms would have been the same as the teachers who never worked in an overload room.

Although teachers with melanoma and cancers of the thyroid, and uterus, had very high, statistically significant risk ratios, there was nothing exceptional about their age at hire, duration of employment, or cumulative GS exposure. However, thyroid cancer and melanoma had relatively short latency times compared to the average latency time for all 18 cancers. The average latency time between start of

TABLE V. Observed and Expected Cancers by Cumulative GS Exposure (GS Unit-Years)

Exposure group	<5,000 GS unit-years	5,000 to 10,000	>10,000 GS unit-years	Total
Average GS unit-years	914	7,007	15,483	
Cancers obs.	9	4	5	18
Cancers exp.	4.507	0.799	1.20	6.49
Risk ratio (O/E)	2.01*	5.00*	4.17*	2.78*
Poisson p	0.0229	0.0076	0.0062	0.000098

Positive trend test (Chi square with one degree of freedom = 38.0, $P = 7.1 \times 10^{-10}$).* $P < 0.05$.

employment at the school and diagnosis for all cancers was 9.7 years. The average latency time for thyroid cancer was 3.0 years and for melanoma it was 7.3 years (with three of the four cases diagnosed at 2, 5, and 5 years).

An independent analysis of this data set by the University of Pittsburgh School of Public Health using OCMAP software supported our findings.

DISCUSSION

Because of access denial, we have no information about the source, or characterization of the high frequency voltage transients. We can assume, because the school uses metal conduit to contain the electrical wiring, that any resultant radiated electric fields from these high frequency voltage transients would radiate mainly from the power cords and from electrical equipment using the power cords within a classroom.

The school's GS readings of high frequency voltage transients are much higher than in other tested places (Table I). Also, teachers in the case school who were employed for over 10 years and who had ever worked in a room with an overload GS reading had a much higher rate of

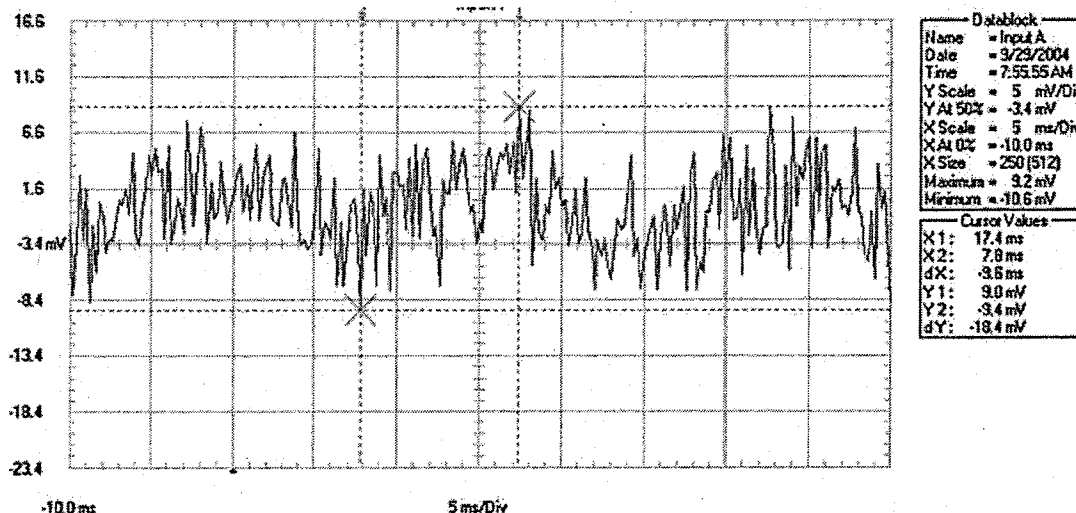
cancer. They made up 7.3% of the cohort but experienced 39% of all cancers.

The relatively short latency time of melanoma and thyroid cancers suggests that these cancers may be more sensitive to the effects of high frequency voltage transients than the other cancers seen in this population.

In occupational cohort studies, it is very unusual to have a number of different cancers with an increased risk. An exception to this is that cohorts exposed to ionizing radiation show an increased incidence of a number of different cancers. The three cancers in this cohort with significantly elevated incidence, malignant melanoma, thyroid cancer and uterine cancer, also have significantly elevated incidence in the large California school employees cohort [Reynolds et al., 1999].

These cancer risk estimates are probably low because 23 of the 137 members of the cohort remain untraced. Since exposure was calculated based on 7 days a week for a year, this will overstate the actual teachers' exposure of 5 days a week for 9 months a year.

We could not study field exposures in the classrooms since we were denied access to the school. We postulate that the dirty power in the classroom wiring exerted its effect by capacitive coupling which induced electrical currents in the



The waveform was recorded between 2 EKG patches placed on the ankles of XXXXXX XXXXXXXXXX standing in front of his kitchen sink at his home near Bright Ontario. It shows a distorted 60 cycle sine wave containing high frequencies applied to each foot, allowing high frequency current to freely oscillate up one leg and down the other. XXXXXX has been diagnosed with prostate cancer since moving to the house in less than a year. He was standing with feet shoulder width apart, wearing shoes, at the time of the readings. The amplitude increased as the feet were placed farther apart.

FIGURE 2. Oscilloscope display of 60 Hz current distorted with high frequencies taken between EKG patches applied to the ankles of a man standing with shoes on at a kitchen sink. [Color figure can be viewed in the online issue, which is available at www.interscience.wiley.com.]

teachers' bodies. The energy that is capacitively coupled to the teachers' bodies is proportional to the frequency. It is this characteristic that highlights the usefulness of the G/S meter. High frequency dirty power travels along the electrical distribution system in and between buildings and through the ground. Humans and conducting objects in contact with the ground become part of the circuit. Figure 2 [Havas and Stetzer, 2004, reproduced with permission] shows an oscilloscope tracing taken between EKG patches on the ankles of a man wearing shoes, standing at a kitchen sink. The 60 Hz sine wave is distorted by high frequencies, which allows high frequency currents to oscillate up one leg and down the other between the EKG patches.

Although not demonstrated in this data set, dirty power levels are usually higher in environments with high levels of 60 Hz magnetic fields. Many of the electronic devices which generate magnetic fields also inject dirty power into the utility wiring. Magnetic fields may, therefore, be a surrogate for dirty power exposures. In future studies of the EMF-cancer association, dirty power levels should be studied along with magnetic fields.

The question of cancer incidence in students who attended La Quinta Middle School for 3 years has not been addressed.

CONCLUSION

The cancer incidence in the teachers at this school is unusually high and is strongly associated with exposure to high frequency voltage transients. In the 28 years since electromagnetic fields (EMFs) were first associated with cancer, a number of exposure metrics have been suggested. If our findings are substantiated, high frequency voltage transients are a new and important exposure metric and a possible universal human carcinogen similar to ionizing radiation.

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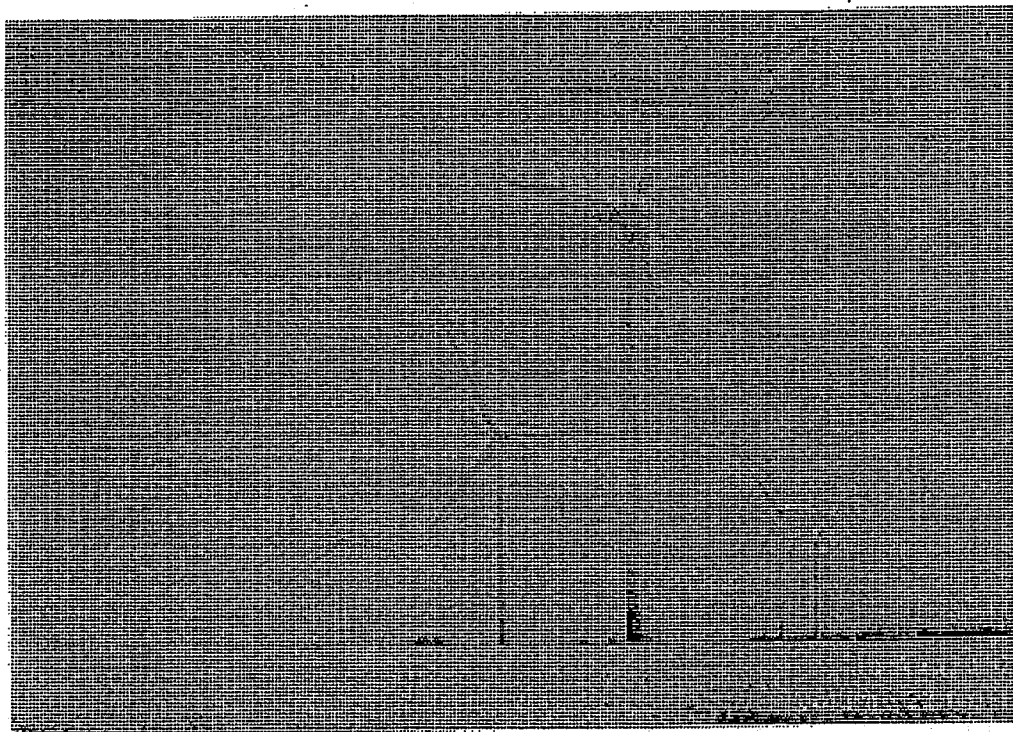
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what audiologists should know



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Wind-Turbine Noise: What Audiologists Should Know Noise from modern wind turbines is not known to cause hearing loss, but the low-frequency noise and vibration emitted by wind turbines may have adverse health effects on humans and may become an important community noise concern.

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Middle School Students and Safe Volume Levels for iPod Use A middle school student researches the habits of her peers when selecting the volume level on personal listening devices. The study concludes that most middle schoolers select unsafe volume levels, and their monaural listening behavior results in further risk to their hearing health.

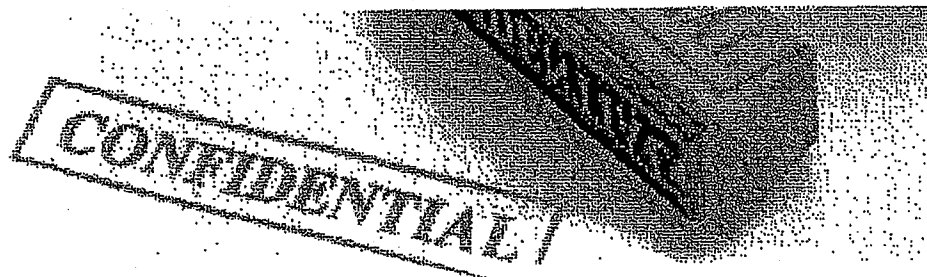
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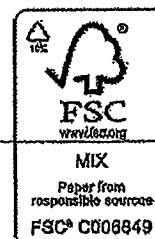
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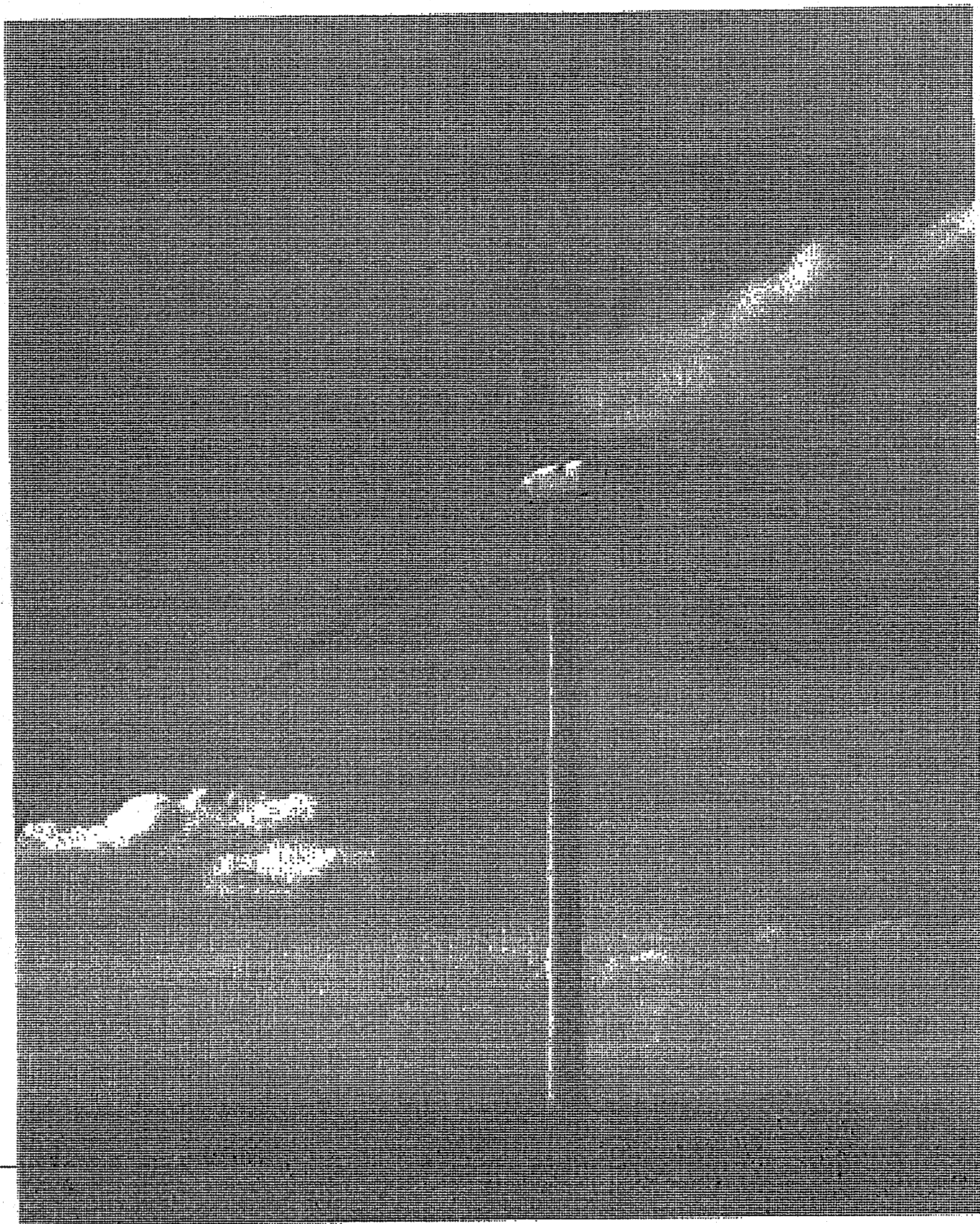
Wind-Turbine NOISE

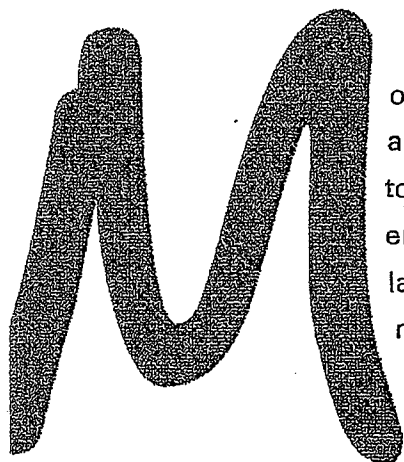
What Audiologists Should Know

BY JERRY PUNCH, RICHARD JAMES, AND DAN PABST

Noise from modern wind turbines is not known to cause hearing loss, but the low-frequency noise and vibration emitted by wind turbines may have adverse health effects on humans and may become an important community noise concern.







Most of us would agree that the modern wind turbine is a desirable alternative for producing electrical energy. One of the most highly touted ways to meet a federal mandate that 20 percent of all energy must come from renewable sources by 2020 is to install large numbers of utility-scale wind turbines. Evidence has been mounting over the past decade, however, that these utility-scale wind turbines produce significant levels of low-frequency noise and vibration that can be highly disturbing to nearby residents.

None of these unwanted emissions, whether audible or inaudible, are believed to cause hearing loss, but they are widely known to cause sleep disturbances. Inaudible components can induce resonant vibration in solids, liquids, and gases—including the ground, houses, and other building structures, spaces within those structures, and bodily tissues and cavities—that is potentially harmful to humans. The most extreme of these low-frequency (infrasonic) emissions, at frequencies under about 16 Hz, can easily penetrate homes. Some residents perceive the

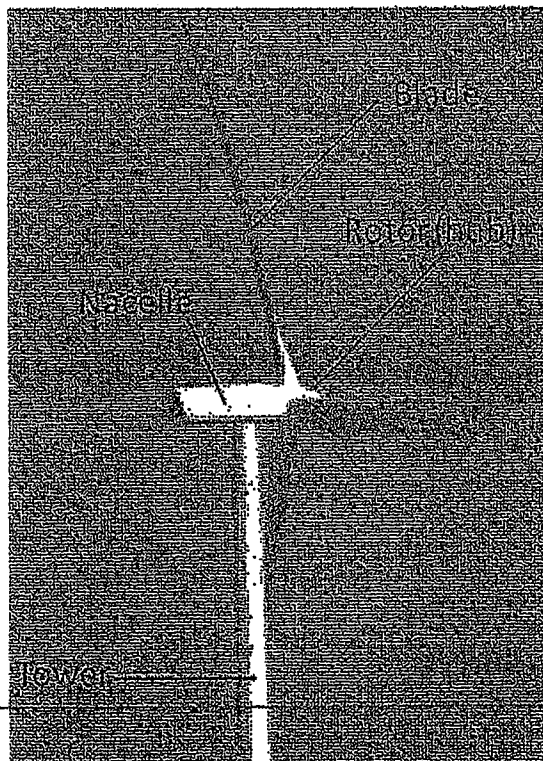
energy as sound, others experience it as vibration, and others are not aware of it at all. Research is beginning to show that, in addition to sleep disturbances, these emissions may have other deleterious consequences on health. It is for these reasons that wind turbines are becoming an important community health issue, especially when hosted in quiet rural communities that have no prior experience with industrial noise or urban hum.

The people most susceptible to disturbances caused by wind turbines may be a small percentage of the total exposed population, but for them the introduction of wind turbines in their communities is not something to which they can easily become acclimated. Instead, they become annoyed, uncomfortable, distressed, or ill. This problem is increasing as newer utility-scale wind turbines capable of generating 1.5-5 MWatts of electricity or more replace the older turbines used over the past 30 years, which produced less than 1 MWatt of power. These large wind turbines can have hub heights that span the length of a football field and blade lengths that span half that distance. The increased size of these multi-MWatt turbines, especially the blades, has been associated with complaints of adverse health effects (AHEs) that cannot be explained by auditory responses alone.

For this article, we reviewed the English-language, peer-reviewed literature from around the world on the topic of wind-turbine noise and vibration and their effects on humans. In addition, we used popular search engines to locate relevant online trade journals, books, reference sources, government regulations, and acoustic and vibration standards. We also consulted professional engineers and psychoacousticians regarding their unpublished ideas and research.

Sources of Wind-Turbine Noise and Vibration

Physically, a modern wind turbine consists of a tower; a rotor (or hub); a set of rotating blades—usually three, located upwind to the tower; and a nacelle, which is an enclosure containing a gearbox, a generator, and



Major components of a modern wind turbine.

computerized controls that monitor and regulate operations (FIGURE 1). Wind speed can be much greater at hub level than at ground level, so taller wind towers are used to take advantage of these higher wind speeds. Calculators are available for predicting wind speed at hub height, based on wind speeds at 10 meter weather towers, which can easily be measured directly.

Mechanical equipment inside the nacelle generates some noise, but at quieter levels than older turbines. This mechanical sound is usually considered of secondary importance in discussions of annoyance from today's turbines. The main cause of annoyance is an aerodynamic source created by interaction of the turning blades with the wind. With optimal wind conditions, this aerodynamic noise is steady and commonly described as an airplane overhead that never leaves.

When wind conditions are not optimal, such as during turbulence caused by a storm, the steady sounds are augmented by fluctuating aerodynamic sounds. Under steady wind conditions, this interaction generates a broadband whooshing sound that repeats itself about once a second and is clearly audible. Many people who live near the wind turbine find this condition to be very disturbing.

The whooshing sound comes from variations of air turbulence from hub to blade tip and the inability of the turbine to keep the blades adjusted at an optimal angle as wind direction varies. The audible portion of the whoosh is around 300 Hz, which can easily penetrate walls of homes and other buildings. In addition, the rotating blades create energy at frequencies as low as 1-2 Hz (the blade-passage frequency), with overtones of up to about 20 Hz. Although some of this low-frequency energy is audible to some people with sensitive hearing, the energy is mostly vibratory to people who react negatively to it.

Adverse Health Effects of Wind-Turbine Noise

Hubbard and Shepherd (1990), in a technical paper written for the National Aeronautics and Space Administration (NASA), were the first to report in depth on the noise and vibration from wind turbines. Most of the relevant research since that time has been conducted by European investigators, as commercial-grade (utility-scale) wind turbines have existed in Europe for many decades. Unfortunately, the research and development done by wind-turbine manufacturers is proprietary and typically has not been shared with the public, but reports of the distressing effects on people living near utility-scale wind turbines in various parts of the world are becoming more common.

Studies carried out in Denmark, The Netherlands, and Germany (Wolsink and Sprengers, 1993; Wolsink et al, 1993), a Danish study (Pedersen and Nielsen, 1994), and two Swedish studies (Pedersen and Persson Waye, 2004, 2007) collectively indicate that wind turbines differ from other sources of community noise in several respects. These investigators confirm the findings of earlier research that amplitude-modulated sound is more easily perceived and more annoying than constant-level sounds (Bradley, 1994; Bengtsson et al, 2004) and that sounds that are unpredictable and uncontrollable are more annoying than other sounds (Geen and McCown, 1984; Hatfield et al, 2002).

Annoyance from wind-turbine noise has been difficult to characterize by the use of such psychoacoustic parameters as sharpness, loudness, roughness, or modulation (Persson Waye and Öhrström, 2002). The extremely low-frequency nature of wind-turbine noise, in combination with the fluctuating blade sounds, also means that the noise is not easily masked by other environmental sounds.

Pedersen et al (2009), in a survey conducted in The Netherlands on 725 respondents, found that noise from

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wind turbines is more annoying than transportation or industrial noises at comparable levels, measured in dBA. They noted that annoyance from turbine sounds at 35 dBA corresponds to the annoyance reported for other common community-noise sources at 45 dBA. Higher visibility of the turbines was associated with higher levels of annoyance, and annoyance was greater when attitudes toward the visual impact of the turbines on the landscape were negative. However, the height of wind turbines means that they are also most clearly visible to the people closest to them and those who also receive the highest sound levels. Thus, proximity of the receiver to wind turbines makes it difficult to determine whether annoyance to the noise is independent of annoyance to the visual impact. Pedersen et al (2009) also found that annoyance was substantially lower in people who benefited economically from having wind turbines located on their property.

Among audiologists and acousticians, it has been understood for many decades that sufficiently intense and prolonged exposure to environmental noise can cause hearing impairment, annoyance, or both. In essence, the view has been what you can hear can hurt you. In the case of wind turbines, it seems that what you can't hear

can also hurt you. Again, there is no evidence that noise generated by wind turbines, even the largest utility-scale turbines, causes hearing loss. But there is increasingly clear evidence that audible and low-frequency acoustic energy from these turbines is sufficiently intense to cause extreme annoyance and inability to sleep, or disturbed sleep, in individuals living near them.

Jung and colleagues (2008), in a Korean study, concluded that low-frequency noise in the frequency range above 30 Hz can lead to psychological complaints and that infrasound in the frequency range of 5–8 Hz can cause complaints due to rattling doors and windows in homes.

The energy generated by large wind turbines can be especially disturbing to the vestibular systems of some people, as well as cause other troubling sensations of the head, chest, or other parts of the body. Dr. Nina Pierpont (2009), in her definitive natural experiment on the subject, refers to these effects as Wind-Turbine Syndrome (WTS). TABLE 1 lists the symptoms that, in various combinations, characterize WTS. Although hearing impairment is not one of the symptoms of WTS, audiologists whose patients report these symptoms should ask them if they live near a wind turbine.

It is well known that sleep deprivation has serious consequences, and we know that noncontinuous sounds and nighttime sounds are less tolerable than continuous and daytime sounds. Somewhat related effects, such as cardiac arrhythmias, stress, hypertension, and headaches have also been attributed to noise or vibration from wind turbines, and some researchers are referring to these effects as Vibroacoustic Disease, or VAD (Castelo Branco, 1999; Castelo Branco and Alves-Pereira, 2004). VAD is described as occurring in persons who are exposed to high-level (>90 dB SPL) infra- and low-frequency noise (ILFN), under 500 Hz, for periods of 10 years or more. It is believed to be a systemic pathology characterized by direct tissue damage to a variety of bodily organs and may involve abnormal proliferation of extracellular matrices.

Alves-Pereira and Castelo Branco (2007) reported on a family who lived near wind turbines and showed signs of VAD. The sound levels in the home were less than 60 dB SPL in each 1/3-octave band below 100 Hz. We have measured unweighted sound levels ranging from 60 to 70 dB Leq (averaged over 1 minute) in these low-frequency bands in Ontario homes of people reporting AHEs from wind turbines. A spectral analysis of sounds emitted at a Michigan site revealed that unweighted peak levels at frequencies under 5 Hz exceeded 90 dB SPL (Wade Bray, pers. comm., 2009).

Table 1. Core Symptoms of Wind-Turbine Syndrome

1	Sleep disturbance
2	Headache
3	Visceral/Vibrotory/Vestibular Disturbance (V/V/D)
4	Dizziness, vertigo, unsteadiness
5	Tinnitus
6	Ear pressure or pain
7	External auditory canal sensation
8	Memory and concentration deficits
9	Irritability, anger
10	Fatigue, loss of motivation

Sources: Pierpont, 2009

Similar observations have been made in studies of people who live near busy highways and airports, which also expose people to low-frequency sounds, both outdoors and in their homes. Evidence is insufficient to substantiate that typical exposures to wind-turbine noise, even in residents who live nearby, can lead to VAD, but early indications are that there are some more-vulnerable people who may be susceptible. Because ILFN is not yet recognized as a disease agent, it is not covered by legislation, permissible exposure levels have not yet been established, and dose-response relationships are unknown (Alves-Pereira, 2007).

As distinguished from VAD, Pierpont's (2009) use of the term Wind-Turbine Syndrome appears to emphasize a constellation of symptoms due to stimulation, or overstimulation, of the vestibular organs of balance due to ILFN from wind turbines (see TABLE 1). One of the most distinctive symptoms she lists in the constellation of symptoms comprising WTS is Visceral Vibratory Vestibular Disturbance (VVVD), which she defines as "a sensation of internal quivering, vibration, or pulsation accompanied by agitation, anxiety, alarm, irritability, rapid heartbeat, nausea, and sleep disturbance" (p. 270).

Drawing on the recent work of Balaban and colleagues (i.e., Balaban and Yates, 2004), Pierpont describes the close association between the vestibular system and its neural connections to brain nuclei involved with balance processing, autonomic and somatic sensory inflow and outflow, the fear and anxiety associated with vertigo or a sudden feeling of postural instability, and aversive learning. These neurological relationships give credence to Pierpont's linkage of the symptoms of VVVD to the vestibular system.

Todd et al (2008) demonstrated that the resonant frequency of the human vestibular system is 100 Hz, concluding that the mechano-receptive hair cells of the vestibular structures of the inner ear are remarkably sensitive to low-frequency vibration and that this sensitivity to vibration exceeds that of the cochlea. Not only is 100 Hz the frequency of the peak response of the vestibular system to vibration, but it is also a frequency at which a substantial amount of acoustic energy is produced by wind turbines. Symptoms of both VAD and VVVD can presumably occur in the presence of ILFN as a result of disruptions of normal paths or structures that mediate the fine coordination between living tissue deformation and activation of signal transducers; these disruptions can lead to aberrant mechano-electrical coupling that can, in turn, lead to conditions such as heart arrhythmias (Ingber, 2008). Ultimately, further research will be needed

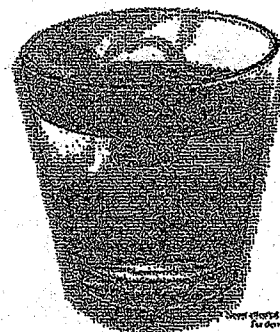
to sort out the commonalities and differences among the symptoms variously described in the literature as VAD, VVVD, and WTS.

Dr. Geoff Leventhall, a British scientist, and his colleagues (Waye et al, 1997; Leventhall, 2003, 2004) have documented the detrimental effects of low-frequency noise exposure. They consider it to be a special environmental noise, particularly to sensitive people in their homes. Waye et al (1997) found that exposure to dynamically modulated low-frequency ventilation noise (20–200 Hz)—as opposed to midfrequency noise exposure—was more bothersome, less pleasant, impacted work performance more negatively, and led to lower social orientation.

Leventhall (2003), in reviewing the literature on the effects of exposure to low-frequency noise, found no evidence of hearing loss but substantial evidence of vibration of bodily structures (chest vibration), annoyance (especially in homes), perceptions of unpleasantness (pressure on the eardrum, unpleasant perception within the chest area, and a general feeling of vibration), sleep disturbance (reduced wakefulness), stress, reduced performance on demanding

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verbal tasks, and negative biological effects that included quantitative measurements of EEG activity, blood pressure, respiration, hormone production, and heart rate.

Regarding work performance, reviewed studies indicated that dynamically modulated low-frequency noise, even when inaudible to most individuals, is more difficult to ignore than mid- or high-frequency noise and that its imperviousness to habituation leads to reduced available information-processing resources. Leventhall hypothesized that low-frequency noise, therefore, may impair work performance. More recently, as a consultant on behalf of the British Wind Energy Association (BWEA), the American Wind Energy Association (AWEA), and the Canadian Wind Energy Association (CANWEA), Leventhall (2006) changed his position, stating that although wind turbines do produce significant levels of low-frequency sound, they do not pose a threat to humans—in effect reverting to the notion that *what you can't hear can't hurt you*.

According to the World Health Organization guidelines (WHO, 2007), observable effects of nighttime, outdoor wind-turbine noise do not occur at levels of 30 dBA or lower. Many rural communities have ambient, nighttime sound levels that do not exceed 25 dBA. As outdoor sound levels increase, the risk of AHEs also increases, with the most vulnerable being the first to show its effects. Vulnerable populations include elderly persons; children,

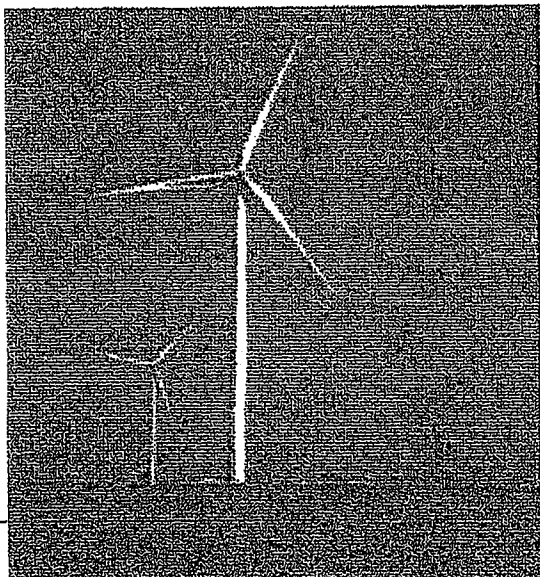
especially those younger than age six; and people with pre-existing medical conditions, especially if sleep is affected. For outdoor sound levels of 40 dBA or higher, the WHO states that there is sufficient evidence to link prolonged exposure to AHEs. While the WHO identifies long-term, nighttime audible sounds over 40 dBA outside one's home as a cause of AHEs, the wind industry commonly promotes 50 dBA as a safe limit for nearby homes and properties. Recently, a limit of 45 dBA has been proposed for new wind projects in Canada (Keith et al, 2008).

Much of the answer as to why the wind industry denies that noise is a serious problem with its wind turbines is because holding the noise to 30 dBA at night has serious economic consequences. The following quotation by Upton Sinclair seems relevant here: "It is difficult to get a man to understand something when his salary depends upon his not understanding it" (Sinclair, 1935, reprinted 1994, p. 109).

In recent years, the wind industry has denied the validity of any noise complaints by people who live near its utility-scale wind turbines. Residents who are leasing their properties for the siting of turbines are generally so pleased to receive the lease payments that they seldom complain. In fact, they normally are required to sign a leasing agreement, or gag clause, stating they will not speak or write anything unfavorable about the turbines. Consequently, complaints, and sometimes lawsuits, tend to be initiated by individuals who live near property on which wind turbines are sited, and not by those who are leasing their own property. This situation pits neighbor against neighbor, which leads to antagonistic divisions within communities.

Measurement of Wind-Turbine Noise

It is important to point out that the continued use of the A-weighting scale in sound-level meters is the basis for misunderstandings that have led to acrimony between advocates and opponents of locating wind turbines in residential areas. The dBA scale grew out of the desire to incorporate a function into the measurement of sound pressure levels of environmental and industrial noise that is the inverse of the minimum audibility curve (Fletcher and Munson, 1933) at the 40-phon level. It is typically used, though, to specify the levels of noises that are more intense, where the audibility curve becomes considerably flattened, obviating the need for A-weighting. It is mandated in various national and international standards for measurements that are compared to damage-risk criteria for hearing loss and other health effects. The A-weighted scale in sound-level meters drastically reduces



Utility-scale wind turbines located in Huron County, Michigan.

sound-level readings in the lower frequencies, beginning at 1000 Hz, and reduces sounds at 20 Hz by 50 dB.

For wind-turbine noise, the A-weighting scale is especially ill-suited because of its devaluation of the effects of low-frequency noise. This is why it is important to make C-weighted measurements, as well as A-weighted measurements, when considering the impact of sound from wind turbines. Theoretically, linear-scale measurements would seem superior to C-scale measurements in wind-turbine applications, but linear-scale measurements lack standardization due to failure on the part of manufacturers of sound-level meters to agree on such factors as low-frequency cutoff and response tolerance limits. The Z-scale, or zero-frequency weighting, was introduced in 2003 by the International Electro-technical Commission (IEC) in its Standard 61672 to replace the flat, or linear, weighting used by manufacturers in the past.

State of Michigan Siting Guidelines

Michigan's siting guidelines (State of Michigan, 2008) will be used as an example of guidelines that deal only in a limited way with sound. These guidelines refer to earlier, now outdated, WHO and Environmental Protection Agency (EPA) guidelines to support a noise criterion that SPLs cannot exceed 55 dBA at the adjacent property line. This level is allowed to be exceeded during severe weather or power outages, and when the ambient sound level is greater than 55 dBA, the turbine noise can exceed

that higher background sound level by 5 dB. These levels are about 30 dB above the nighttime levels of most rural communities. When utility-scale turbines were installed in Huron County, Michigan, in May 2008, the WHO's 2007 guidelines that call for nighttime, outside levels not to exceed 30 dBA were already in place. Based on measurements made by the authors, these turbines produce 40–45 dBA sound levels at the perimeter of a 1,000 ft radius under typical weather conditions, and the additive effects of multiple turbines produce higher levels. Many of the turbines have been located close enough to homes to produce very noticeable noise and vibration.

Kamperman and James (2009) have offered recommendations for change in the State of Michigan guidelines (2008) for wind turbines. Some of the more pertinent details of the Michigan siting guidelines are shown in the left-hand column of TABLE 2. The state of Michigan permits sound levels that do not exceed 55 dBA or L90 + 5 dBA, whichever is greater, measured at the property line closest to the wind-energy system. These guidelines make no provisions to limit low-frequency sounds from wind-turbine operations.

In consideration of the current WHO guidelines (2007), measurements made by the authors in Huron County, Michigan, indicate that the current Michigan guidelines do not appear adequate to protect the public from the nuisances and known health risks of wind-turbine noise. In fact, these guidelines appear to be especially lenient

Table 2. Current and Proposed Wind-Turbine Siting Guidelines

*Source: State of Michigan, 2008

**Source: Kamperman and James, 2009

in terms of tolerable sound levels. Sound levels that approach 20 dBA higher than natural ambient levels are considered unacceptable in most countries; Michigan permits 30 dBA increases.

In considering the health and well-being of people living near wind-turbine projects, the changes recommended by Kamperman and James (2009) would abandon the 55 dBA limit in favor of the commonly accepted criteria of $L_{90} + 5$ dBA, for both A- and C-scale readings, where L_{90} is the preconstruction ambient level. These recommendations also include a prohibition against any wind-turbine-related sound levels exceeding 35 dBA on receiving properties that include homes or other structures in which people sleep. Additional protections against low-frequency sound are given in the right-hand column of TABLE 2. These recommended provisions would protect residents by limiting the difference between C-weighted

and sleep disturbances are common in people who live up to about 1.25 miles away. This is the setback distance at which a group of turbines would need to be in order not to be a nighttime noise disturbance (Kamperman and James, 2009). It is also the setback distance used in several other countries that have substantial experience with wind turbines, and is the distance at which Pierpont (2009) found very few people reporting AHEs.

A study conducted by van den Berg (2003) in The Netherlands demonstrated that daytime levels cannot be used to predict nighttime levels and that residents within 1900 mile (1.18 mile) of a wind-turbine project expressed annoyance from the noise. Pierpont (2009) recommends baseline minimum setbacks of 2 kilometers (1.24 mile) from residences and other buildings such as hospitals, schools, and nursing homes, and longer setbacks in mountainous terrain and when necessary to meet the noise criteria developed by Kamperman and James (2009).

In a panel review report, the American Wind Energy Association (AWEA) and Canadian Wind Energy Association (CANWEA) have objected to setbacks that exceed 1 mile (Colby et al, 2009). A coalition of independent medical and acoustical experts, the Society for Wind Vigilance (2010), has provided a recent rebuttal to that report. The society has described the panel review as a typical product of industry-funded white papers, being neither authoritative nor convincing. The society accepts as a medical fact that sleep disturbance, physiological stress, and psychological distress can result from exposure to wind-turbine noise.

Wind turbines have different effects on different people. Some of these effects are somewhat predictable based on financial compensation, legal restrictions on free speech included in the lease contracts with hosting landowners, and distance of the residence from wind projects, but they are sometimes totally unpredictable. Planning for wind projects needs to be directed not only toward benefitting society at large but also toward protecting the individuals living near them. We believe that the state of Michigan, and other states that have adopted similar siting guidelines for wind turbines, are not acting in the best interest of all their citizens and need to revise their siting guidelines to protect the public from possible health risks and loss of property values, as well as reduce complaints about noise annoyance.

Wind-utility developers proposing new projects to a potential host community are often asked if their projects will cause the same negative community responses that are heard from people living in the footprint of operating projects. They often respond that they will use a different

People living near wind turbines may experience sleep disturbance.

L_{eq} during turbine operation and the quietest A-weighted pre-operation background sound levels, plus 5 dB, to no more than 20 dB at the property line. This level should not exceed 55 dB L_{eq} on the C scale, or 60 dB L_{eq} for properties within one mile of major heavily trafficked roads, which sets a higher tolerance for communities that tend to experience slightly noisier conditions.

Implementation of the recommendations of Kamperman and James would result in siting wind turbines differently than what is currently planned for future wind-turbine projects in Michigan. This change would result in sound levels at nearby properties that are much less noticeable, and much less likely to cause sleep deprivation, annoyance, and related health risks. These sound-level measurements should be made by independent acoustical engineers or knowledgeable audiologists who follow ANSI guidelines (1993, 1994) to ensure fair and accurate readings, and not by representatives of the wind industry.

People living within a mile of one or more wind turbines, and especially those living within a half mile, have frequent sleep disturbance leading to sleep deprivation,

type of wind turbine or that reports of complaints refer to older-style turbines that they do not use. In our opinion, these statements should usually be viewed as diversionary.

Finally, it is important to note that there is little difference in noise generated across makes and models of modern utility-scale, upwind wind turbines once their power outputs are normalized. Kamperman (pers. comm., 2009), after analyzing data from a project funded by the Danish Energy Authority (Søndergaard and Madsen, 2008), has indicated that when the A-weighted sound levels are converted to unweighted levels, the low-frequency energy from industrial wind turbines increases inversely with frequency at a rate of approximately 3 dB per octave to below 10 Hz (the lowest reported frequency). Kamperman has concluded that the amount of noise generated at low frequencies increases by 3–5 dB for every MW of electrical power generated. Because turbines are getting larger, this means that future noise problems are likely to get worse if siting guidelines are not changed.

Conclusion

Our purpose in this article has been to provide audiologists with a better understanding of the types of noise generated by wind turbines, some basic considerations underlying sound-level measurements of wind-turbine noise, and the adverse health effects on people who live near these turbines. In future years, we expect that audiologists will be called upon to make noise measurements in communities that have acquired wind turbines, or are considering them. Some of us, along with members of the medical profession, will be asked to provide legal testimony regarding our opinions on the effects of such noise on people. Many of us will likely see clinical patients who are experiencing some of the adverse health effects described in this article.

As a professional community, audiologists should become involved not only in making these measurements to corroborate the complaints of residents living near wind-turbine projects but also in developing and shaping siting guidelines that minimize the potentially adverse health effects of the noise and vibration they generate. In these ways, we can promote public health interests without opposing the use of wind turbines as a desirable and viable alternative energy source. ☺

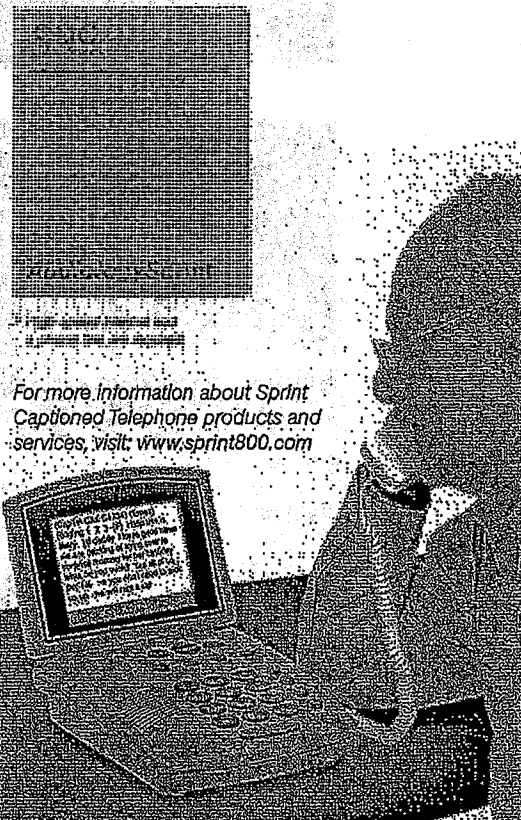
Jerry Punch, PhD, Richard James, BME, and Dan Pabst, BS, are with the Department of Communicative Sciences and Disorders, Michigan State University, East Lansing, MI.



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Portions of this work were presented at the Annual Convention of the American Speech-Language-Hearing Association (ASHA), November 2009, New Orleans, LA.

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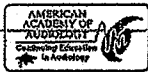
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6



Review Article

Responses of the ear to low frequency sounds, infrasound and wind turbines

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ABSTRACT

Infrasonic sounds are generated internally in the body (by respiration, heartbeat, coughing, etc) and by external sources, such as air conditioning systems, inside vehicles, some industrial processes and, now becoming increasingly prevalent, wind turbines. It is widely assumed that infrasound presented at an amplitude below what is audible has no influence on the ear. In this review, we consider possible ways that low frequency sounds, at levels that may or may not be heard, could influence the function of the ear. The inner ear has elaborate mechanisms to attenuate low frequency sound components before they are transmitted to the brain. The auditory portion of the ear, the cochlea, has two types of sensory cells, inner hair cells (IHC) and outer hair cells (OHC), of which the IHC are coupled to the afferent fibers that transmit "hearing" to the brain. The sensory stereocilia ("hairs") on the IHC are "fluid coupled" to mechanical stimuli, so their responses depend on stimulus velocity and their sensitivity decreases as sound frequency is lowered. In contrast, the OHC are directly coupled to mechanical stimuli, so their input remains greater than for IHC at low frequencies. At very low frequencies the OHC are stimulated by sounds at levels below those that are heard. Although the hair cells in other sensory structures such as the saccule may be tuned to infrasonic frequencies, auditory stimulus coupling to these structures is inefficient so that they are unlikely to be influenced by airborne infrasound. Structures that are involved in endolymph volume regulation are also known to be influenced by infrasound, but their sensitivity is also thought to be low. There are, however, abnormal states in which the ear becomes hypersensitive to infrasound. In most cases, the inner ear's responses to infrasound can be considered normal, but they could be associated with unfamiliar sensations or subtle changes in physiology. This raises the possibility that exposure to the infrasound component of wind turbine noise could influence the physiology of the ear.

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1. Introduction

The increasing use of wind turbines as a "green" form of energy generation is an impressive technological achievement. Over time, there have been rapid increases in the size of the towers, blades, and generator capacity of wind turbines, as well as a dramatic increase in their numbers. Associated with the deployment of wind turbines, however, has been a rather unexpected development. Some people are very upset by the noise that some wind turbines produce. Wind turbine noise becomes annoying at substantially lower levels than other forms of transportation noise, with the exception of railroad shunting yards (Pedersen and Waye, 2004; Pedersen and Persson Waye, 2007; Pedersen et al., 2009). Some

people with wind turbines located close to their homes have reported a variety of clinical symptoms that in rare cases are severe enough to force them to move away. These symptoms include sleep disturbance, headaches, difficulty concentrating, irritability and fatigue, but also include a number of otologic symptoms including dizziness or vertigo, tinnitus and the sensation of aural pain or pressure (Harry, 2007; Pierpont, 2009). The symptom group has been colloquially termed "wind turbine syndrome" and speculated to result from the low frequency sounds that wind turbines generate (Pierpont, 2009). Similar symptoms resulting from low frequency sound emissions from non-wind turbine sources have also been reported (Feldmann and Pitten, 2004).

On the other hand, engineers associated with the wind industry maintain that infrasound from wind turbines is of no consequence if it is below the audible threshold. The British Wind Energy Association (2010), states that sound from wind turbines are in the 30–50 dBA range, a level they correctly describe as difficult to discern above the rustling of trees [i.e. leaves].

This begs the question of why there is such an enormous discrepancy between subjective reactions to wind turbines and the measured sound levels. Many people live without problems near

Abbreviations: CA, cochlear aqueduct; CM, cochlear microphonic; CSF, cerebrospinal fluid; cVEMP, cervical vestibular evoked myogenic potential; EP, endocochlear potential; IHC, inner hair cell(s); oVEMP, ocular vestibular evoked myogenic potential; OHC, outer hair cell(s); RW, round window; ST, scala tympani; SV, scala vestibuli.

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noisy intersections, airports and factories where sound levels are higher. The answer may lie in the high infrasound component of the sound generated by wind turbines. A detailed review of the effects of low frequency noise on the body was provided by Leventhall (2009). Although it is widely believed that infrasound from wind turbines cannot affect the ear, this view fails to recognize the complex physiology that underlies the ear's response to low frequency sounds. This review considers the factors that influence how different components of the ear respond to low frequency stimulation and specifically whether different sensory cell types of the inner ear could be stimulated by infrasound at the levels typically experienced in the vicinity of wind turbines.

2. The physics of infrasound

Sounds represent fluctuating pressure changes superimposed on the normal ambient pressure, and can be defined by their spectral frequency components. Sounds with frequencies ranging from 20 Hz to 20 kHz represent those typically heard by humans and are designated as falling within the audible range. Sounds with frequencies below the audible range are termed infrasound. The boundary between the two is arbitrary and there is no physical distinction between infrasound and sounds in the audible range other than their frequency. Indeed, infrasound becomes perceptible if presented at high enough level.

The level of a sound is normally defined in terms of the magnitude of the pressure changes it represents, which can be measured and which does not depend on the frequency of the

sound. In contrast, for sounds of constant pressure, the displacement of the medium is inversely proportional to frequency, with displacements increasing as frequency is reduced. This phenomenon can be observed as the difference in vibration amplitude between a subwoofer generating a low frequency tone and a tweeter generating a high frequency tone at the same pressure level. The speaker cone of the subwoofer is visibly displaced while the displacement of the tweeter cone is imperceptible. As a result of this phenomenon, vibration amplitudes to infrasound are larger than those to sounds in the auditory range at the same level, with displacements at 1 Hz being 1000 times those at 1 kHz when presented at the same pressure level. This corresponds to an increase in displacement at a rate of 6 dB/octave as frequency is lowered.

3. Overview of the anatomy of the ear

The auditory part of the inner ear, the cochlea, consists of a series of fluid-filled tubes, spiraling around the auditory nerve. A section through the middle of a human cochlea is shown in Fig. 1A. The anatomy of each turn is characterized by three fluid-filled spaces (Fig. 1B): scala tympani (ST) and scala vestibuli (SV) containing perilymph (yellow), separated by the endolymphatic space (ELS) (blue). The two perilymphatic compartments are connected together at the apex of the cochlea through an opening called the helicotrema. Perilymph is similar in ionic composition to most other extracellular fluids (high Na^+ , low K^+) while endolymph has a unique composition for an extracellular fluid in the body, being

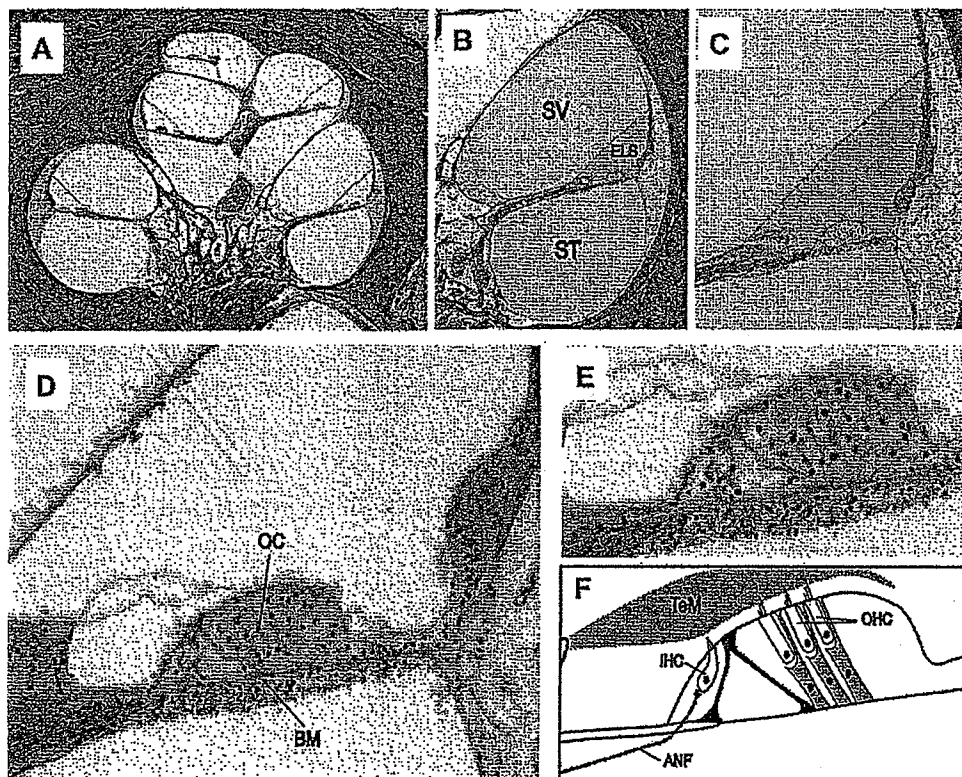


Fig. 1. Panels A–E Cross-section through the human cochlea shown with progressively increasing magnification. Panels B and C The fluid spaces containing perilymph have been colored yellow and endolymph blue. Panel D The sensory structure of the cochlea, the organ of Corti, is colored green. Panel F Schematic showing the anatomy of the main components of the organ of Corti. Abbreviations are: SV: scala vestibuli; ST: scala tympani; ELS: endolymphatic space; OC: organ of Corti; BM: basilar membrane; TeM: tectorial membrane; IHC: inner hair cell; OHC: outer hair cell; ANF: afferent nerve fiber. Original histological images courtesy of Saumil Merchant, MD, Otopathology Laboratory, Massachusetts Eye and Ear Infirmary and Harvard Medical School, Boston.

high in K^+ and low in both Na^+ and Ca^{2+} . It is also electrically polarized by about +80 mV with respect to perilymph, which is called the endocochlear potential (EP). The main sensory organ of the cochlea (Fig. 1C–E, and shown colored green in Fig. 1D) lies on the basilar membrane between the ELS and the perilymph of ST and is called the organ of Corti. The organ of Corti, seen here in cross section, contains one row of inner hair cells (IHC) and three rows of outer hair cells (OHC) along the spiral length of the cochlea. As shown schematically in Fig. 1F, the sensory hairs (stereocilia) of the OHC have a gradation in length, with the tallest stereocilia embedded in the gelatinous tectorial membrane (TeM) which overlies the organ of Corti in the endolymphatic space (Kimura, 1975). This arrangement allows sound-evoked displacements of the organ of Corti to be converted to a lateral displacement of OHC stereocilia. In contrast, the stereocilia of the IHC do not contact the tectorial membrane, but remain within the fluid of the subreticular space (Kimura, 1975; Lim, 1986). Because of this difference in how the hair cell stereocilia interact with the TeM, the two types of hair cell respond differently to mechanical stimuli. At low frequencies, the IHC respond according to the velocity of basilar membrane displacement, while OHC respond to the displacement itself (Russell and Sellick, 1983; Dallos, 1984).

The two types of hair cells also contact different types of afferent nerve fibers, sending information to the brain (Spoendlin, 1972; Santi and Tsuprun, 2001). Each IHC is innervated by multiple Type I afferent fibers, with each fiber innervating only a single IHC. The Type I afferents represent the vast majority (95%) of the fibers transmitting information to the brain and as a result it is generally believed that mammals hear with their IHC (Dallos, 2008). In contrast, the OHC contact Type II afferent fibers, which are unmyelinated and make synaptic contacts with a number of OHC. Type II afferent fibers are believed to be unresponsive to sounds and may

signal the static position of the organ of Corti (Brown, 1994; Robertson et al., 1999). The OHC also receive substantial efferent innervation (from the brain) while the IHC receive no direct efferent innervation (Spoendlin, 1972).

4. Mechanics of low frequency stimulation

Infrasound entering the ear through the ossicular chain is likely to have a greater effect on the structures of the inner ear than is sound generated internally. The basic principles underlying stimulation of the inner ear by low frequency sounds are illustrated in Fig. 2. Panel A shows the compartments of a simplified, uncoiled cochlea bounded by solid walls with two parallel fluid spaces representing SV and ST respectively that are separated by a distensible membrane representing the basilar membrane and organ of Corti. It is generally agreed that the differential pressure between SV and ST across the basilar membrane is the important factor driving the motion of the basilar membrane (Von Békésy, 1960; Dancer and Franke, 1980; Nakajima et al., 2008; Merchant and Rosowski, 2008). In example A, all the boundaries of the inner ear are solid and noncompliant with the exception of the stapes. In this non-physiologic situation, the stapes applies pressures to SV (indicated by the red arrows) but as the fluid can be considered incompressible, pressures are instantaneously distributed throughout both fluid spaces and pressure gradients across the basilar membrane will be small. In panel B, the round window (RW) and the cochlear aqueduct (CA) have been added to the base of ST. For frequencies below 300 Hz the RW provides compliance between perilymph and the middle ear (Nakajima et al., 2008) and the CA provides fluid communication between perilymph and the cerebrospinal fluid (CSF). Under this condition, pressures applied by the stapes induce small volume flows between the stapes and

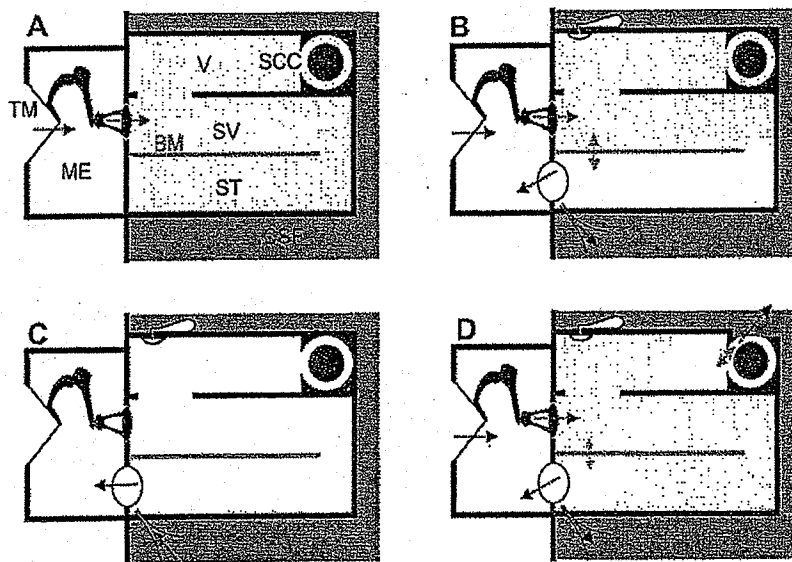


Fig. 2. Schematic representation of the uncoiled inner ear for four different mechanical conditions with low frequency stimulation. Red arrows indicate applied pressure and blue arrows indicate loss to compliant structures. A: indicates a hypothetical condition where the fluid space is rigidly bounded with no "windows" providing compliance. Sound pressure applied by the stapes causes uniform pressures (indicated by color shading) throughout the fluid space, so pressure difference across the basilar membrane and therefore stimulation is minimal. B: The normal situation with compliances provided by the round window and cochlear aqueduct causing stimulation. C: Situation where low frequency enters scala tympani through the cochlear aqueduct. The main compliant structure is located nearby so pressure gradients across the basilar membrane are small, limiting the amount of stimulation. Infrasound entering through the cochlear aqueduct (such as from respiration and body movements) therefore does not provide the same degree of stimulation as that entering via the stapes. D: Situation with compromised otic capsule, such as superior canal dehiscence. As pressure gradients occur both along the cochlea and through the vestibule and semi-circular canal, the sensory structures in the semi-circular canal will be stimulated. Abbreviations: BM: basilar membrane; CA: cochlear aqueduct; CSF: cerebrospinal fluid; ES: endolymphatic duct and sac; ME: middle ear; RW: round window; SCC: semi-circular canal; ST: scala tympani, SV: scala vestibuli, TM: tympanic membrane; V: vestibule. The endolymphatic duct and sac is not an open pathway but is closed by the tissues of the sac, so it is not considered a significant compliance.

the site(s) of compliance (blue arrows) which requires a pressure gradient to exist along the system, as indicated by the shading. The pressure differential across the basilar membrane will displace it, causing stimulation of the IHC and OHC. This is the situation for external sounds entering the normal cochlea via the ossicular chain. In panel C the situation is compared for sounds originating in the CSF and entering the system through the CA. In this case, the compliant RW is situated close to the location of aqueduct entry, so the major fluid flows and pressure gradients occur locally between these structures. As the stapes and other boundaries in scala vestibuli and the vestibule are relatively noncompliant, pressure gradients across the basilar membrane will be lower than with an equivalent pressure applied by the stapes. For infrasonic frequencies, it was shown that responses to 1 Hz pressure oscillation applied to the fluid in the basal turn of ST were substantially increased when the wall of SV was perforated thereby providing greater compliance in that scala (Salt and DeMott, 1999).

The final condition in Fig. 2D shows the consequences of a “third window” on the SV/vestibule side of the cochlear partition. This causes an increased “air-bone gap” (i.e. an increase in sensitivity to bone conducted vibration and a decreased sensitivity to air conducted sounds, primarily at low frequencies; Merchant and Rosowski, 2008). It may also produce an abnormal sound-induced stimulation of other receptors in the inner ear, such as the hair cells in the ampulla of the semi-circular canal. This is the basis of the Tullio phenomenon, in which externally or internally generated sounds, such as voice, induce dizziness.

Receptors in other organs of the inner ear, specifically both the saccule and the utricle also respond to airborne sounds delivered by the stapes, as discussed in more detail below. The mechanism of hair cell stimulation of these organs is less certain, but is believed to be related to pressure gradients through the sensory epithelium (Sohmer, 2006).

5. Physiologic responses of the ear to low frequency stimuli

5.1. Cochlear hair cells

When airborne sounds enter the ear, to be transduced into an electrical signal by the cochlear hair cells, they are subjected to a number of mechanical and physiologic transformations, some of which vary systematically with frequency. The main processes involved were established in many studies and were summarized by Cheatham and Dallos (2001). A summary of the components is shown in Fig. 3. There are three major processes influencing the sensitivity of the ear to low frequencies. The first arises from the transmission characteristics of sounds through the ossicular structures of the middle ear, which have been shown to attenuate signals at a rate of 6 dB/octave for frequencies below 1000 Hz (Dallos, 1973). As the vibration amplitude in air increases at 6 dB/octave as frequency is lowered, this attenuation characteristic of middle ear transmission results in the displacement of middle ear structures remaining almost constant across frequency for sounds of constant pressure level. A second process attenuating low frequency sounds is the fluid shunting between ST and SV through the helicotrema. The helicotrema has been shown to attenuate frequencies below 100 Hz by 6 dB/octave (Dallos, 1970). The third filter arises from the demonstrated dependence of the IHC on stimulus velocity, rather than displacement (Dallos, 1984). This results in an attenuation of 6 dB/octave for frequencies below approximately 470 Hz for the IHC, and causes a 90° phase difference between IHC and OHC responses (Dallos, 1984). The combined results of these processes are compared with the measured sensitivity of human hearing (ISO226, 2003) in Fig. 3B. The three processes combine to produce the steep decline of sensitivity (up to

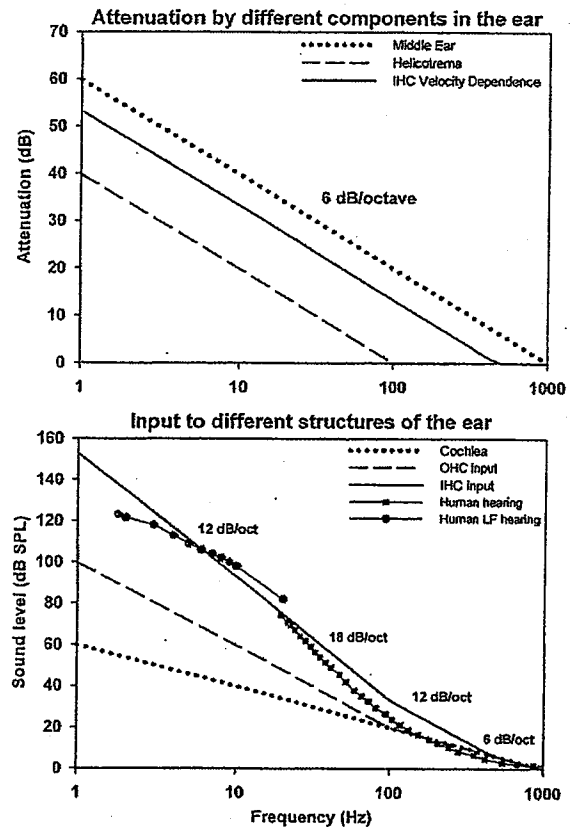


Fig. 3. Upper panel: Estimated properties of high-pass filter functions associated with cochlear signal processing (based on Cheatham and Dallos, 2001). The curves show the low frequency attenuation provided by the middle ear (6 dB/octave below 1000 Hz), by the helicotrema (6 dB/octave below 100 Hz) and by the fluid coupling of the inner hair cells (IHC) resulting in the IHC dependence on stimulus velocity (6 dB/octave below 470 Hz). Lower panel: Combination of the three processes above into threshold curves demonstrating: input to the cochlea (dotted) as a result of middle ear attenuation; input to the outer hair cells (OHC) as a result of additional filtering by the helicotrema; and input to the IHC as a result of their velocity dependence. Shown for comparison is the sensitivity of human hearing in the audible range (ISO226, 2003) and the sensitivity of humans to infrasounds (Møller and Pederson, 2004). The summed filter functions account for the steep (18 dB/octave) decrease in sensitivity below 100 Hz.

18 dB/octave) in human hearing for frequencies between 100 and 20 Hz. This steep cutoff means that to hear a stimulus at 5 Hz it must be presented at 105 dB higher level than one at 500 Hz. This reflects the fact that the predominant, type I afferent fibers are stimulated by the IHC and that mammals hear with their IHC (Dallos, 2008). However, an important consequence of this underlying mechanism is that the OHC and IHC differ markedly in their responses to low frequency stimuli. As the OHC respond to displacement, rather than velocity, they are not subject to the 6 dB/octave attenuation seen by IHC, so at low frequencies they are stimulated by lower sound levels than the IHC. In theory, the difference between IHC and OHC responses will increase as frequency decreases (becoming over 50 dB at 1 Hz), but in practice, there is interaction between the two types of hair cells which limits the difference as discussed below.

The measured response phase of OHC, IHC and auditory nerve fibers is consistent with the above processes. The cochlear microphonics (CM) recorded in the organ of Corti with low frequency stimuli are in phase with the intracellular potentials of the OHC. This supports the view that the low frequency CM is dominated by

OHC-generated potentials, which follow the displacement of the basilar membrane (Dallos et al., 1972). In contrast, intracellular responses from the IHC lead the organ of Corti CM response by an amount which approaches 90° as frequency is reduced to 100 Hz (Dallos, 1984) corresponding to maximal basilar membrane velocity towards SV (Nuttall et al., 1981). As frequency is lowered, the intracellular potentials of IHC and afferent fiber responses show phase changes consistent with the IHC no longer responding to the increasingly attenuated velocity stimulus, but instead responding to the extracellular potentials generated by the OHC (Sellick et al., 1982; Cheatham and Dallos, 1997). A similar change of phase as frequency is lowered was reported in human psychophysical measurements (Zwicker, 1977) with masking patterns differing by approximately 90° for frequencies above and below 40 Hz. This transition from a response originating from mechanical stimulation of the IHC, to one originating from electrical stimulation of the IHC by large extracellular responses from the OHC may account for the transition of low frequency sensitivity in humans from 18 dB/octave above 20 Hz to 12 dB/octave below 10 Hz (Møller and Pederson, 2004) (Fig. 3B). Near 10 Hz the IHC transition to become primarily stimulated by the more sensitive OHC responses. It can be inferred that if extracellular voltages generated by the OHC are large enough to electrically stimulate the IHC at a specific frequency and level, then the lowest level that the OHC respond to at that frequency must be substantially lower. Based on this understanding of how the sensitivity of the ear arises, one conclusion is that at low frequencies the OHC are responding to infrasound at levels well below those that are heard. On the basis of the calculated input to OHC in Fig. 3B, it is possible that for frequencies around 5 Hz, the OHC could be stimulated at levels up to 40 dB below those that stimulate the IHC. Although the OHC at 1 kHz are approximately 12 dB less sensitive than IHC (Dallos, 1984), this difference declines as frequency is lowered and differences in hair cell sensitivity at very low frequencies (below 200 Hz) have not been measured.

Much of the work understanding how the ear responds to low frequency sounds is based on measurements performed in animals. Although low frequency hearing sensitivity depends on many factors including the mechanical properties of the middle ear, low frequency hearing sensitivity has been shown to be correlated with cochlear length for many species with non-specialized cochleas, including humans and guinea pigs (West, 1985; Echtele et al., 1994). The thresholds of guinea pig hearing have been measured with stimulus frequencies as low as 50 Hz, as shown in Fig. 4A. The average sensitivity at 125 Hz for five groups in four studies (Heffner et al., 1971; Miller and Murray, 1966; Walloch and Taylor-Spikes, 1976; Prosen et al., 1978; Fay, 1988) was 37.9 dB SPL, which is 17.6 dB less sensitive than the human at the same frequency and is consistent with the shorter cochlea of guinea pigs. In the absence of data to the contrary, it is therefore reasonable to assume that if low frequency responses are present in the guinea pig at a specific level, then they will be present in the human at a similar or lower stimulus level.

5.2. Cochlear microphonic measurements

Cochlear microphonics (CM) to low frequency tones originate primarily from the OHC (Dallos et al., 1972; Dallos and Cheatham, 1976). The sensitivity of CM as frequency is varied is typically shown by CM isopotential contours, made by tracking a specified CM amplitude as frequency is varied. Fig. 4B shows low frequency CM sensitivity with two different criteria (Dallos, 1973: 3 μ V; Salt et al., 2009: 500 μ V). The decrease in CM sensitivity as frequency is lowered notably follows a far lower slope than that of human hearing over the comparable frequency range. In the data from Salt et al. (2009), the stimulus level differences between 5 Hz and 500 Hz average only 34 dB (5.2 dB/octave), compared to the 105 dB

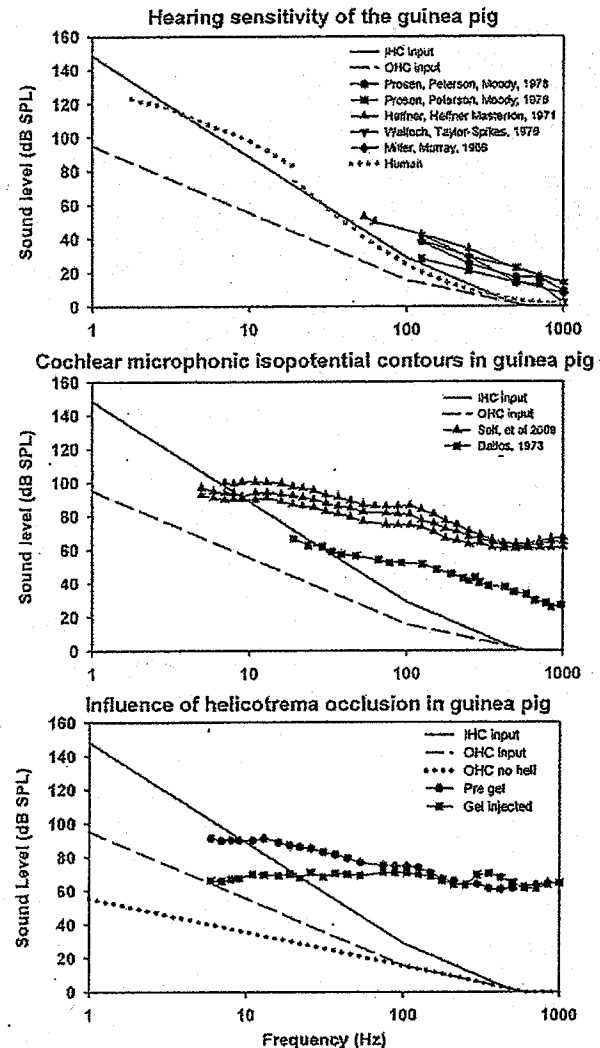


Fig. 4. Upper panel: Similar filter functions as Fig. 3, with parameters appropriate for the guinea pig, and compared with measures of guinea pig hearing. At 125 Hz the guinea pig is approximately 18 dB less sensitive than the human (shown dotted for comparison). Middle panel: Cochlear microphonic isopotential contours in the guinea pig show no steep cutoff below 100 Hz, consistent with input to the OHC being maintained at lower levels than the IHC for low frequencies. Lower panel: Influence of helicotrema occlusion in the guinea pig, produced by injecting 2 μ L of hyaluronate gel into the cochlear apex, on the CM isopotential function. Also shown for comparison is the estimated input sensitivity for the OHC with the attenuation by the helicotrema excluded. CM sensitivity curves both have lower slopes than their predicted functions, but the change caused by helicotrema occlusion is comparable.

difference (15.8 dB/octave) for human hearing over the same range. Although these are suprathreshold, extracellular responses, based on an arbitrary amplitude criterion, these findings are consistent with the OHC having a lower rate of cutoff with frequency than the IHC, and therefore responding to lower level stimuli at very low frequencies.

The measured change in CM sensitivity with frequency may include other components, such as a contribution from transducer adaptation at the level of the OHC stereocilia (Kros, 1996). Kennedy et al. (2003) have suggested that adaptation of the mechano-electrical transducer channels is common to all hair cells and contributes to driving active motion of the hair cell bundle. Based

on their measurements in cells isolated from the apical turns of neonatal rats, they estimated that the adaptation caused high-pass filtering with a low frequency cutoff frequency of $2/3$ of the best frequency for the cochlear location. This type of adaptation, however, does not appear to provide additional attenuation at very low frequencies, as inferred from CM sensitivity curves measured down to 5 Hz. On the contrary, the CM sensitivity curve appears to flatten below 10 Hz, a phenomenon which is currently under investigation in our laboratory.

Fig. 4C shows the influence of plugging the helicotrema with gel on CM sensitivity with frequency, recorded from the basal turn of a guinea pig with a 500 μ V criterion (Salt et al., 2009). These relative sensitivity changes, combined with a 90° phase shift in responses, replicate those of Franke and Dancer (1982) and demonstrate the contribution to attenuation provided by the helicotrema for frequencies below approximately 100 Hz. This contrasts with a prior suggestion that the helicotrema of the guinea pig was less effective than that of other species (Dallos, 1970). While the above CM measurements were made with the bulla open, measurements made in both the bulla open/closed conditions with closed sound-field stimulation suggest there is no pronounced frequency dependence of the difference between these conditions below 300 Hz although there may be a level difference of 5–15 dB (Dallos, 1973; Wilson and Johnstone, 1975).

5.3. Low frequency biasing, operating point, and distortion generation

As a result of the saturating, nonlinear transducer characteristic of cochlear hair cells (Russell and Sellick, 1983; Kros, 1996), the fidelity of cochlear transduction depends highly on the so-called operating point of the cochlear transducer, which can be derived by Boltzmann analysis of the CM waveform (Patuzzi and Moleirinho, 1998; Patuzzi and O'Beirne, 1999). The operating point can be regarded as the resting position of the organ of Corti or its position during zero crossings of an applied stimulus (which may not be identical, as stimulation can itself influence operating point). Small displacements of operating point have a dramatic influence on even-order distortions generated by the cochlea ($2f$, $f_2 - f_1$) while having little influence on odd-order distortions ($3f$, $2f_1 - f_2$) until displacements are large (Frank and Kössl, 1996; Sirjani et al., 2004). Low frequency sounds (so-called bias tones) have been shown to modulate distortion generated by the ear by their displacement of the operating point of the organ of Corti (Brown et al., 2009). In normal guinea pigs, 4.8 Hz bias tones at levels of 85 dB SPL have been shown to modulate measures of operating point derived from an analysis of CM waveforms (Brown et al., 2009; Salt et al., 2009). This is a level that is substantially below the expected hearing threshold of the guinea pig at 4.8 Hz. In animals where the helicotrema was occluded by injection of gel into the perilymphatic space at the cochlear apex, even lower bias levels (down to 60 dB SPL) modulate operating point measures (Salt et al., 2009). These findings are again consistent with the OHC being the origin of the signals measured and the OHC being more responsive to low frequency sounds than the IHC. A similar hypersensitivity to 4.8 Hz bias tones was also found in animals with surgically-induced endolymphatic hydrops (Salt et al., 2009). This was thought to be related to the occlusion of the helicotrema by the displaced membranous structures bounding the hydropic endolymphatic space in the apical turn. In some cases of severe hydrops, Reissner's membrane was seen to herniate into ST. As endolymphatic hydrops is present both in patients with Meniere's disease and in a significant number of asymptomatic patients (Merchant et al., 2005), the possibility exists that some individuals may be more sensitive to infrasound due the presence of endolymphatic hydrops.

In the human ear, most studies have focused on the $2f_1 - f_2$ distortion product, as even-order distortions are difficult to record in humans. The $2f_1 - f_2$ component has been demonstrated to be less sensitive to operating point change (Sirjani et al., 2004; Brown et al., 2009). Using different criteria of bias-induced distortion modulation, the dependence on bias frequency was systematically studied in humans for frequencies down to 25 Hz, 6 Hz and 15 Hz respectively (Bian and Scherrer, 2007; Hensel et al., 2007; Marquardt et al., 2007). In each of these studies, the bias levels required were above those that are heard by humans, but in all of them the change of sensitivity with frequency followed a substantially lower slope than the hearing sensitivity change as shown in Fig. 5. Again this may reflect the OHC origins of acoustic emissions, possibly combined with the processes responsible for the flattening of equal loudness contours for higher level stimuli, since the acoustic emissions methods are using probe stimuli considerably above threshold. Although in some regions, slopes of 9–12 dB/octave were found, all showed slopes of 6 dB/octave around the 20 Hz region where human hearing falls most steeply at 18 dB/octave. It should also be emphasized that each of these studies selected a robust modulation criterion and was not specifically directed at establishing a threshold for the modulation response at each frequency. Indeed, in the data of Bian and Scherrer (2007) (their Fig. 3), significant modulation can be seen at levels down to 80 dB SPL at some of the test frequencies. In one of the studies (Marquardt et al., 2007) equivalent measurements were performed in guinea pigs. Although somewhat lower slopes were observed in guinea pigs it is remarkable that stimulus levels required for modulation of distortion were within 5–10 dB of each other for guinea pigs and humans across most of the frequency range. In this case the guinea pig required lower levels than the human. Although the threshold of sensitivity cannot be established from these studies, it is worth noting that for distortion product measurements in the audible range, "thresholds" typically require stimulus levels in the 35–45 dB SPL range (Lonsbury-Martin et al., 1990). In the Marquardt study, the bias tone level required at 500 Hz is over 60 dB above hearing threshold at that frequency.

5.4. Feedback mechanisms stabilizing operating point

The OHC not only transduce mechanical stimuli to electrical responses, but also respond mechanically to electrical stimulation

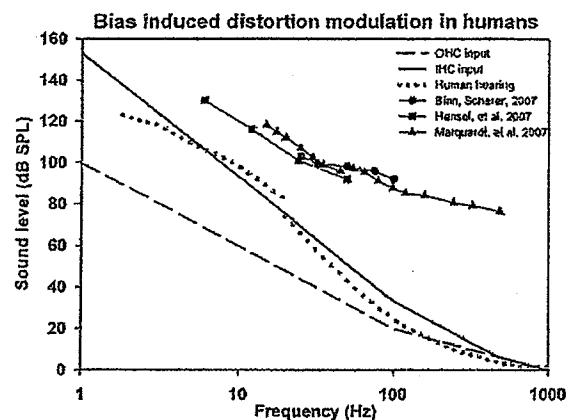


Fig. 5. Frequency dependence of low frequency bias-induced modulation of the $2f_1 - f_2$ distortion product measured in the external ear canal of humans in three studies, compared with estimated input functions and human hearing sensitivity. Below 100 Hz the sensitivity to bias falls off at a much lower slope than human hearing, consistent with the response originating from OHC with a lower cutoff slope.

(reviewed by Dallos, 2008) in a manner that provides mechanical amplification. This “active tuning” primarily enhances responses to high stimulus frequencies and is thought to provide little or no active gain with stimuli below approximately 1 kHz (Sellick et al., 2006). For low frequency stimulation, however, basilar membrane modulation by the low frequency tone does have a major influence on the mechanics at the best frequency of high frequency tones i.e. on the active tuning process (Patuzzi et al., 1984). It has been suggested that slow mechanical movements of the OHC may play a part in stabilizing the operating point of the transducer (LePage, 1987, 1989) so the OHC may participate in an active cancellation of low frequency sounds. In models of the cochlear transducer, it was proposed that negative feedback occurred at low frequencies (in which the OHC opposed movements of the basilar membrane), which becomes a positive feedback at the best frequency for the region (Mountain et al., 1983). Chan and Hudspeth (2005) have also suggested OHC motility may be exploited to maintain the operating point of a fast amplifier in the hair cell bundle. However, this possibility has recently been questioned by Dallos (Ashmore et al., 2010) for a number of reasons, one of which is the somatic motor protein, prestin, has an extremely fast response capability. So the interrelationships between hair cell motility and transduction, and between OHC and IHC remain an intense focus of current research. For low frequencies, it has been shown that an out-of phase motion exists between the IHC reticular lamina and the overlying TM so that electromechanical action of the OHC may stimulate the IHC directly, without involvement of the basilar membrane (Nowotny and Gummer, 2006). The possible roles of the OHC and efferent systems are made more complex by recent findings of reciprocal synapses between OHC and their efferent terminals, seen as afferent and efferent synapses on the same fiber (Thiers et al., 2008). One explanation for this system is that the synapses may locally (without involvement of the central nervous system) coordinate the responses of the OHC population so that optimum operating point is maintained for high frequency transduction.

There is some evidence for active regulation of operating point based on the biasing of acoustic emission amplitudes by low frequency tones in which a “hysteresis” was observed (Bian et al., 2004). The hysteresis was thought to result from active motor elements, either in the stereocilia or the lateral wall of the OHC, shifting the transducer function in the direction of the bias. A similar hysteresis was also reported by Lukashkin and Russell (2005) who proposed that a feedback loop was present during the bias that keeps the operating point at its most sensitive region, shifting it in opposite directions during compression and rarefaction phase of the bias tone thereby partially counteracting its effects.

If there are systems in the cochlea to control operating point as an integral component of the amplification process, they would undoubtedly be stimulated in the presence of external infrasound.

5.5. Vestibular function

The otolith organs, comprising of the saccule and utricle, respond to linear accelerations of the head (Uzun-Coruhlu et al., 2007) and the semi-circular canals respond to angular acceleration. These receptors contribute to the maintenance of balance and equilibrium. In contrast to the hair cells of the cochlea, the hair cells of the vestibular organs are tuned to very low frequencies, typically below 30 Hz (Grossman et al., 1988). Frequency tuning in vestibular hair cells results from the electrochemical properties of the cell membranes (Manley, 2000; Art and Fettiplace, 1987) and may also involve active mechanical amplification of their stereociliary input (Hudspeth, 2008; Rabbitt et al., 2010). Although vestibular hair cells are maximally sensitive to low frequencies they typically do not

respond to airborne infrasound. Rather, they normally respond to mechanical inputs resulting from head movements and positional changes with their output controlling muscle reflexes to maintain posture and eye position. At the level of the hair cell stereocilia, although vibrations originating from head movements and low frequency sound would be indistinguishable, the difference in sensitivity lies in the coupling between the source stimulus and the hair cell bundle. Head movements are efficiently coupled to the hair cell bundle, while acoustic stimuli are inefficiently coupled due to middle ear characteristics and the limited pressure gradients induced within the structure with sound stimuli (Sohmer, 2006).

In a similar manner to cochlear hair cells, which respond passively (i.e. without active amplification) to stimuli outside their best frequency range, vestibular hair cells respond passively to stimuli outside their best frequency range. The otolith organs have been shown to respond to higher, acoustic frequencies delivered in the form of airborne sounds or vibration. This has been demonstrated in afferent nerve fiber recordings from vestibular nerves (Young et al., 1977; McCue and Guinan, 1994; Curthoys et al., 2006) and has recently gained popularity as a clinical test of otolith function in the form of vestibular evoked myogenic potential (VEMP) testing (Todd et al., 2003; Zhou and Cox, 2004; Curthoys, 2010). These responses arise because higher frequency stimuli are more effectively coupled to the otolithic hair cells. But as sound or vibration frequency is reduced, its ability to stimulate the vestibular organs diminishes (Murofushi et al., 1999; Hullar et al., 2005; Todd et al., 2008). So for very low frequencies, even though the hair cell sensitivity is increasing as active tuning is invoked, mechanical input is being attenuated. While there have been many studies of vestibular responses to physiologic stimuli (i.e. head accelerations, rotations, etc) comprising of infrasonic frequency components, we are unaware of any studies that have directly investigated vestibular responses to airborne infrasound of similar frequency composition. As people do not become unsteady and the visual field does not blur when exposed to high-level infrasound, it can be concluded that sensitivity is extremely low.

In some pathologic conditions, coupling of external infrasound may be greater. It is known that “third window” defects, such as superior canal dehiscence increase the sensitivity of labyrinthine receptors to sounds (Wit et al., 1985; Watson et al., 2000; Carey et al., 2004), and are exhibited as the Tullio phenomenon (see earlier section). To our knowledge, the sensitivity of such patients to controlled levels of infrasound has never been evaluated. In this respect, it needs to be considered that vestibular responses to stimulation could occur at levels below those that are perceptible to the patient (Todd et al., 2008).

5.6. Inner ear fluids changes

Some aspects of cochlear fluids homeostasis have been shown to be sensitive to low frequency pressure fluctuations in the ear. The endolymphatic sinus is a small structure between the saccule and the endolymphatic duct which has been implicated as playing a pivotal role in endolymph volume regulation (Salt, 2005). The sinus has been shown to act as a valve, limiting the volume of endolymph driven into the endolymphatic sac by pressure differences across the endolymphatic duct (Salt and Rask-Andersen, 2004). The entrance of saccular endolymph into the endolymphatic sac can be detected either by measuring the K^+ concentration in the sac (as saccular endolymph has substantially higher K^+ concentration) or by measuring hydrostatic pressure. The application of a sustained pressure to the vestibule did not cause K^+ elevation or pressure increase in the sac, confirming that under this condition, flow was prevented by the membrane of the sinus acting as a valve. In contrast, the application of 5 cycles at 0.3 Hz to the

external ear canal, caused a K^+ increase in the sac, confirming that oscillation of pressure applied to the sinus allowed pulses of endolymph to be driven from the sinus into the endolymphatic sac. The pressure changes driving these pulses was large, comparable to those produced by contractions of the tensor tympani muscle, as occurs during swallowing. Tensor tympani contractions produce displacements of the stapes towards the vestibule for a duration of approximately 0.5 s (~2 Hz), which induce large EP changes and longitudinal movements of endolymph within the cochlea (Salt and DeMott, 1999). The lowest sound level that drives endolymph movements is currently unknown.

A therapeutic device (the Meniett: www.meniett.com; Odkvist et al., 2000) that delivers infrasound to the inner ear is widely used to treat Meniere's disease in humans (a disease characterized by endolymphatic hydrops). The infrasonic stimulus (6 Hz or 9 Hz) is delivered by the device in conjunction with sustained positive pressure in the external canal. An important aspect of this therapy, however, is that a tympanostomy tube is placed in the tympanic membrane before the device is used. The tympanostomy tube provides an open perforation of the tympanic membrane which shunts pressure across the structure, so that ossicular movements (and cochlear stimulation) are minimized, and the pressures are applied directly to the round window membrane. Nevertheless, the therapeutic value of this device is based on infrasound stimulation influencing endolymph volume regulation in the ear.

As presented above, endolymphatic hydrops, by occluding the perilymph communication pathway through the helicotrema, makes the ear more sensitive to infrasound (Salt et al., 2009). It has also been shown that non-damaging low frequency sounds in the acoustic range may themselves cause a transient endolymphatic hydrops (Flock and Flock, 2000; Salt, 2004). The mechanism underlying this volume change has not been established and it has never been tested whether stimuli in the infrasound range cause endolymphatic hydrops.

Although infrasound at high levels apparently does not cause direct mechanical damage to the ear (Westin, 1975; Jauchem and Cook, 2007) in animal studies it has been found to exacerbate functional and hair cell losses resulting from high level exposures of sounds in the audible range (Harding et al., 2007). This was explained as possibly resulting from increased mixture of endolymph and perilymph around noise induced lesion sites in the presence of infrasound.

6. Wind turbine noise

Demonstrating an accurate frequency spectrum of the sound generated by wind turbines creates a number of technical problems. One major factor that makes understanding the effects of wind turbine noise on the ear more difficult is the widespread use of A-weighting to document sound levels. A-weighting shapes the measured spectrum according to the sensitivity of human hearing, corresponding to the IHC responses. As we know the sensitivity for many other elements of inner ear related to the OHC do not decline at the steep slope seen for human hearing, then A-weighting considerably underestimates the likely influence of wind turbine noise on the ear. In this respect, it is notable that in none of the physiological studies in the extensive literature reporting cochlear function at low frequencies were the sound stimuli A-weighted. This is because scientists in these fields realize that shaping sound levels according to what the brain perceives is not relevant to understanding peripheral processes in the ear. A-weighting is also performed for technical reasons, because measuring unweighted spectra of wind turbine noise is technically challenging and suitable instrumentation is not widely available. Most common approaches to document noise levels (conventional sound level meters, video

cameras, devices using moving coil microphones, etc) are typically insensitive to the infrasound component. Using appropriate instrumentation, Van den Berg showed that wind turbine noise was dominated by infrasound components, with energy increasing between 1000 Hz and 1 Hz (the lowest frequency that was measured) at a rate of approximately 5.5 dB/octave, reaching levels of approximately 90 dB SPL near 1 Hz Sugimoto et al. (2008) reported a dominant spectral peak at 2 Hz with levels monitored over time reaching up to 100 dB SPL. Jung and Cheung (2008) reported a major peak near 1 Hz at a level of approximately 97 dB SPL. In most studies of wind turbine noise, this high level, low frequency noise is dismissed on the basis that the sound is not perceptible. This fails to take into account the fact that the OHC are stimulated at levels that are not heard.

7. Conclusions

The fact that some inner ear components (such as the OHC) may respond to infrasound at the frequencies and levels generated by wind turbines does not necessarily mean that they will be perceived or disturb function in any way. On the contrary though, if infrasound is affecting cells and structures at levels that cannot be heard this leads to the possibility that wind turbine noise could be influencing function or causing unfamiliar sensations. Long-term stimulation of position-stabilizing or fluid homeostasis systems could result in changes that disturb the individual in some way that remains to be established. We realize that some individuals (such as fighter pilots) can be exposed to far higher levels of infrasound without undue adverse effects. In this review, we have confined our discussion to the possible direct influence of infrasound on the body mediated by receptors or homeostatic processes in the inner ear. This does not exclude the possibility that other receptor systems, elsewhere in the body could contribute to the symptoms of some individuals.

The main points of our analysis can be summarized as follows:

- 1) Hearing perception, mediated by the inner hair cells of the cochlea, is remarkably insensitive to infrasound.
- 2) Other sensory cells or structures in the inner ear, such as the outer hair cells, are more sensitive to infrasound than the inner hair cells and can be stimulated by low frequency sounds at levels below those that are heard. The concept that an infrasonic sound that cannot be heard can have no influence on inner ear physiology is incorrect.
- 3) Under some clinical conditions, such as Meniere's disease, superior canal dehiscence, or even asymptomatic cases of endolymphatic hydrops, individuals may be hypersensitive to infrasound.
- 4) A-weighting wind turbine sounds underestimates the likely influence of the sound on the ear. A greater effort should be made to document the infrasound component of wind turbine sounds under different conditions.
- 5) Based on our understanding of how low frequency sound is processed in the ear, and on reports indicating that wind turbine noise causes greater annoyance than other sounds of similar level and affects the quality of life in sensitive individuals, there is an urgent need for more research directly addressing the physiologic consequences of long-term, low level infrasound exposures on humans.

Acknowledgments

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File No. 044504-0087

LATHAM & WATKINS LLP

October 17, 2012

VIA FEDEX & E-MAIL

County of San Diego Planning Commission
Attn: Cheryl Jones
5510 Overland Avenue
San Diego, CA 92123

Re: Tule Wind Project Grandfathered Under Proposed Wind Energy Ordinance

Dear Commissioners:

I am writing on behalf of Tule Wind LLC regarding the proposed Wind Energy Ordinance. Staff has indicated its intent to apply the Wind Energy Ordinance to the Tule Wind Project ("Tule"), even though the Board of Supervisors approved Tule on August 8 under the existing zoning ordinance. Applying the Wind Energy Ordinance to Tule would violate the County's zoning code and would be bad policy for the following reasons:

- (1) The Zoning Code expressly provides for grandfathering in this situation. Zoning Code section 1019 applies specifically to this situation, and it expressly prohibits the Wind Energy Ordinance from being applied to Tule: "Any application for a permit or other approval regulated in any manner by the provisions of this Zoning Ordinance shall only be required to meet the provisions of this Ordinance that were in effect on the date that application was deemed complete." Tule clearly meets the requirements of this grandfathering provision.
- (2) The Courts agree that Zoning Code section 1019 grants vested rights. In *Davidson v. County of San Diego*, the Court of Appeal has concluded that Zoning Code section 1019 provides a vested right to the applicant at the time the application was deemed complete, based on the laws and regulations that existed on the date the right vested.¹ Tule meets the requirements of Zoning Code section 1019 and has vested rights under the *Davidson* case.

¹ (1996) 49 Cal. App. 4th 639, 648.

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(3) Tule was approved just weeks ago, after careful deliberation by the Board of Supervisors.

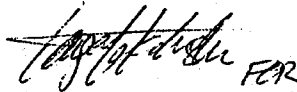
The Board of Supervisors approved the major use permit, zone change, and community plan amendment for Tule on August 8. The Wind Energy Ordinance is now before the Planning Commission with the express purpose of harmonizing it with Board's approval of Tule. The Board of Supervisors did not indicate when they approved Tule that the approval was somehow "provisional" and that a whole new set of regulations would apply only weeks later.

(4) The County's policy is to avoid late hits. The Land Use and Environmental Group recently adopted a formal policy to avoid "late hits," or shifting regulatory requirements, during the development process. Just two months *after* the Board approved Tule, staff is now proposing to change the rules for Tule, which is directly contrary to the policy.

For these reasons, we ask that you revise the Wind Energy Ordinance to expressly acknowledge that the Tule Wind Project is grandfathered and is not subject to new provisions of the Wind Energy Ordinance.

If you have any questions, please do not hesitate to contact me at daniel.brunton@lw.com or at (619) 237-8910.

Best regards,

Handwritten signature of Daniel Brunton in black ink, with the letters "FER" written to the right of the signature.

Daniel Brunton
of LATHAM & WATKINS LLP

cc: Mark Mead
Jeff Murphy
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April 16, 2012

VIA FEDERAL EXPRESS AND EMAIL

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File No. 044504-0067

Re: Qualification for Waiver under Proposed Wind Ordinance

Dear Mr. Schneider:

As you know, our client, Iberdrola Renewables, LLC ("Iberdrola Renewables"), has given County staff complete information on the noise impacts and overall benefits that the Tule Wind Project's proposed wind turbines would provide. At this point, our submitted application regarding wind turbines on County land is for a total of five turbines. We understand that our project will not be covered by the proposed Wind Ordinance because our application was deemed complete in 2011.

Nonetheless, we would like to know—and we expect that the Planning Commission and the Board of Supervisors would like to know—whether the Tule Wind Project's five proposed wind turbines on County land would be able to obtain a staff recommendation that the Project should receive a waiver under the proposed Section 6952(f)(2), as staff has drafted the proposed ordinance. Does staff believe that the Tule Wind Project should receive a waiver under this section? (if the Project were subject to the staff-drafted ordinance, which it currently is not)

The answer to this question will help everyone understand how the staff's proposed waiver section will work using a real-world example. If the staff does not feel it could recommend something like the Tule project's five County turbines for a waiver then that is valuable information for informing the public and the regulated community about how the waiver provision would work if adopted by the County.

If the staff is unable, at this time (despite our completed application and two years of meetings with the County staff), to make a determination as to what its recommendation would be in this situation with the example of these five turbines, then this inability would also be valuable information about how difficult it will be for anyone to make a prediction as to how the waiver provision would work for another other project.

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If Iberdrola can supply any further information that may be needed to explain if the Tule Project were to qualify for a waiver under the staff's proposed section, please let me know.

This answer is important information that staff should be able to prepare based on our completed application for use at the next Planning Commission meeting on the Wind Ordinance, as the upcoming Planning Commission meeting on Iberdrola Renewables' Tule Wind Project.

Please do not hesitate to contact me at (619) 238-2827 or christopher.garrett@lw.com.

Sincerely,



Christopher W. Garrett
of LATHAM & WATKINS LLP

cc: Eric Gibson
David Sibbet
Mark Slovick
John Gibson
Jim Whalen
Phil Rath
Harley McDonald

LATHAM & WATKINS^{LLP}

February 14, 2013

Mark Wardlaw
Director of Dept. of Planning and Development Services
County of San Diego
5510 Overland Avenue, Suite 310
San Diego, CA 92123

Re: Draft Wind Energy Ordinance

Dear Mark:

We appreciated the invitation to meet with you and your staff in December about the proposed Wind Energy Ordinance and are looking forward to meeting with you again soon. I am writing this letter to replace the letter we previously sent on January 25, 2013.

As we have explained previously, we strongly believe the Wind Energy Ordinance would not apply to the Tule wind project, which is grandfathered under the County's Code of Ordinances. But in the interest of working together to improve the Wind Energy Ordinance, and avoiding unnecessary uncertainty over the Board of Supervisor's approval of Tule, we describe our main concerns with the Wind Energy Ordinance below.

Pure tone noise requirements; section 6952(f)

As we have discussed previously, applying the Wind Energy Ordinance's pure-tone noise requirements to Tule would be particularly problematic. The Tule project was painstakingly reviewed by the Public Utilities Commission and County staff under the County's existing noise ordinance, which does not include special requirements for pure tone noise. Noise analysis is very technical, and this process literally took several years. Ultimately, it yielded a project that is conservatively designed to meet the County's current noise ordinance and that contains several conditions to assure this, including the following:

- APM TULE-NOI-5: "Turbines will be kept in good running order throughout the operational life of the project."
- MUP Condition 56 requires noise control design measures "to reduce the impacts of the exterior sound levels from the project site" and ensure compliance with the (current) County noise ordinance.

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- o MUP Condition 81 requires a site-specific noise mitigation plan "to ensure that noise from turbines will not adversely impact surrounding residences" and will comply with the (current) County noise ordinance.

With these requirements, the Board of Supervisors specifically found that the project will have no significant noise impacts. Applying a new noise standard to Tule would be inconsistent with the Board of Supervisor's findings, and could require months or years of additional study under the new standard, which would delay the project or even render it infeasible to build.

Fencing requirement; section 6952(d) *Complies*

Section 6952(d) of the draft Wind Energy Ordinance requires "Public access to a large wind turbine shall be restricted through the use of a fence with locked gates, non-climbable towers or other suitable measures."

We believe Tule is consistent with this requirement because the project design uses modern turbines, the base of which cannot be accessed without a special key. Without access to the tower's base there can be no access to the rest of the turbine. In addition, the project site is entirely surrounded by federal land under the Bureau of Land Management's jurisdiction. But this provision appears to grant the County a great deal of discretion, and we lack any assurance that the Tule project would be found to comply with this provision.

Decommissioning plan—timing for removing non-operational turbines; section 6952(j) *not ambiguous*

Section 6952(j)(2) of the draft Wind Energy Ordinance requires a decommissioning plan for removal of a wind energy turbine and restoration of the site within 180 days of a turbine becoming non-operational. Read together with Section 6952(j), the intent of this section appears to be that (1) a large wind turbine is deemed non-operational when it has not been operated for 180 consecutive days (unless it is undergoing maintenance); and (2) after the 180 days of initial non-operation passes, the decommissioning plan allows another 180 days to actually remove the turbine and restore the site. But this provision appears to be ambiguous, and could be read to require a permittee to remove turbines immediately after they are deemed non-operational, i.e., immediately after 180 consecutive days of non-operation (not counting periods of maintenance). It would be impracticable for permittees to comply with such an interpretation; large wind turbines are very large pieces of equipment that require heavy machinery and a coordinated effort to remove.

Other Wind Energy Ordinance provisions *inconsistent with 20 Sept. 1019*

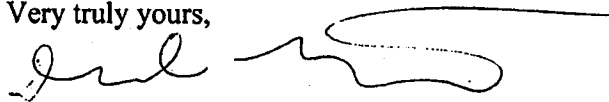
We have been told by staff that only certain sections of the Wind Energy Ordinance, listed in the attached matrix we received from staff, would apply to already approved wind energy projects like Tule. Given this direction from staff, we have focused our comments on these provisions. But it is also important that the Wind Energy Ordinance make clear that its remaining provisions do not apply to approved wind energy projects. As one example, section 6952(f)(1) of the draft Wind Energy Ordinance requires an acoustical study with standards different than those the County used in analyzing and approving Tule. We understand staff to be

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saying that this provision would not apply to Tule, and we agree that it should not apply to Tule. But we think clarity is needed in the ordinance itself on which provisions do not apply to already approved projects. Again, we do not agree that any of the Wind Energy Ordinance would apply to Tule, which is grandfathered. But if staff's intent is to designate certain sections of the Wind Energy Ordinance as not applying to approved projects like Tule, we believe this should be made clearer.

We hope this makes our primary concerns with the proposed Wind Energy Ordinance clear, and we look forward to discussing these issues with you. In the meantime, please do not hesitate to call me at (619) 237-8910 to discuss the Wind Energy Ordinance or Tule.

Very truly yours,

A handwritten signature in black ink, appearing to read 'Daniel P. Brunton', followed by a long horizontal line extending to the right.

Daniel P. Brunton
of LATHAM & WATKINS LLP

cc: Harley McDonald
Phil Rath

6952 b.	Location. The lot shall be located in a wind resources area shown on the Wind Resources Map approved by the Board of Supervisors on _____ and on file at the Clerk of the Board of Supervisors as document number _____.	Complies
6952 d.	Barriers. Public access to a large wind turbine shall be restricted through the use of a fence with locked gates, non-climbable towers or other suitable measures.	Required to Comply
6952 e.	Signs. A warning signs containing only a telephone number and an address for emergency calls and informational inquiries shall face each vehicular access point to the turbine. Individual signs shall be between five and 16 square feet in size.	Required to Comply
6952 f.3	Pure Tone. If the sound from a large wind turbine while operating contains a steady or intermittent pure tone, such as a whine, screech or hum, the applicable standards for noise set forth in County Code section 36.404 shall be reduced by five dBA. A "pure tone" exists if one-third of the octave band sound pressure level in the band, including the tone, exceeds the arithmetic average of sound pressure levels of the two contiguous one-third octave bands by five dBA for center frequencies of 500 Hz or more, by eight dBA for center frequencies between 160 Hz and 400 Hz, or by 15 dBA for center frequencies less than or equal to 125 Hz.	Required to comply at operational phase,
6952 j.	Nonoperational Wind Turbine. Except for periods of maintenance, a large wind turbine that is non-operational for 180 consecutive days shall be decommissioned as specified in subsection 2 below. 1. Upon written request by the Department of Planning and Development Services, the Permittee of a Major Use Permit for a large wind turbine shall provide data to the satisfaction of the Director to allow the Director to determine the "operational" status of the large wind turbine.	Required to comply at operational phase
6952 j.	2. Decommissioning Plan. The applicant shall prepare and submit a decommissioning plan to the Director for his review and approval. The plan shall provide for the removal of all components of each large wind turbine and the restoration of the site to a condition compatible with surrounding properties within 180 days of the wind turbine becoming non-operational. 3. Secured Agreement. The applicant shall also enter into a secured agreement with the County that requires the decommissioning plan to be implemented and completed. The terms and conditions of the agreement	Required to comply Comply Tule MUP is

	shall be to the satisfaction of the Director. The Director is authorized to sign the agreement on behalf of the County. The security provided with the agreement shall be in an amount sufficient to cover the County's costs, as determined by the Director, to implement and complete the decommissioning plan in case the owner or operator fails to implement and/or complete the plan. The security shall be in a form approved by the Director. Typical forms of security include a surety bond, irrevocable letter of credit or trust funds. The security shall remain in effect for the entire time that the large wind turbine is operational and for any additional time until the decommissioning has been completed in accordance with the decommissioning plan. 4. Building Permit. No building permit for any component of a large wind turbine may be issued until the Director approves the decommissioning plan, signs the secured agreement and accepts the security	silent on this provision.
6952 l.	Design. When a Major Use Permit authorizes more than one large wind turbine, all of the large wind turbines subject to the Major Use Permit shall be uniform in color and tower and turbine design (pole, nacelle, etc.). In addition if there are existing large wind turbines on a lot that abuts the lot on which proposed large wind turbines would be located, the color and tower and turbine design of the proposed large wind turbines shall be uniform with that of the existing large wind turbines. Tower and turbine design does not include turbine height which may vary.	Required to Comply
6952 m.	Property Maintenance. Except for periods of maintenance the property on which a large turbine is located shall be kept clean of turbine parts and or debris associated with the turbine operation.	Required to comply at operational phase