

# The Sunrise Powerlink Fire Hazard

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The Sunrise Powerlink, regardless of the final path proposed for it, would traverse many miles of extremely flammable vegetation between its eastern and western terminals. That power lines present a significant fire hazard is acknowledged by both fire agencies and utilities. This has prompted CDF, the US Forest Service, SDG&E, and PG&E to collaborate on the "Power Line Fire Prevention Field Guide"[12]. This reference guide makes the following observation:

*"The potential exists that power line caused fires will become conflagrations during the long, hot and dry fire season commonly experienced in California. The very same weather conditions that contribute to power line faults also lead and contribute to the rapid spread of wildfire. The most critical of these weather factors is high wind, which is commonly accompanied by high temperatures and low humidity.*

*High, gusty winds may cause vegetation to sway into power lines, break off limbs or fall into power lines. High winds may also create vibrations in power lines that can lead to stress failures or cause loose connections to separate. Arcing usually accompanies such faults. Automatic reclosers re-energizing the line into the fault may cause repeated arcing and increase the probability of igniting vegetation."*

Many of the communities potentially along the path of the Sunrise Powerlink are fire-weary, having suffered massive losses during the Cedar fire of October 2003 and the Pines fire of 2002. By the time the Powerlink, if constructed, becomes operational, the wildland fuel load in these communities will have returned to the level capable of supporting a major conflagration. Having another potential fire source in the backcountry would be perceived as an affront to communities that had recently suffered the loss of over 2,200 homes and 15 lives.

How significant is the risk? CDF statistics from 1998 indicate that 155 fires in their jurisdiction were ignited by power lines, representing a fraction of 3% of the total [7]. However, if we look at only major fires (leading to the greatest structure losses or acreage burned), the fraction caused by power lines seems to be higher – approximately 10% or more. Examining the 20 historically largest fires in terms of area gives three started by power lines: Laguna (San Diego, 1970), Campbell Complex (Tehama, 1990), and Clampitt (Los Angeles, 1970) [1]. In terms of structure loss, there were also three fires started by power lines: Laguna (San Diego, 1970), City of Berkeley (1923), and Sycamore (Santa Barbara, 1977)[2]. If we examine the top five fires for acreage and structure loss in the years spanning 1999 and 2004 [3,4,5] we find a similar pattern emerge: 5 of the 60 top slots were power line fires (the Geysers, Pines, and Poe fires).

The Pines fire was near Julian, not far from the proposed routes, and was the largest fire in terms of structure and acreage loss in California during 2002.

The probability of seeing 10% of large fires caused by power lines while only 3% of smaller fires were caused by power lines could be a statistical fluctuation, but this is somewhat improbable. Two possible causal connections can also be suggested here: 1) Power lines are more likely to be near human habitation than other ignition sources, thus making structure loss more likely. This would not explain the enhancement of large acreage fires, though. 2) As noted in the CDF/USFS/SDG&E/PG&E guide [12], power lines are more likely to be a source of combustion during high wind conditions. These are the very conditions under which catastrophic wildfires take place [20].

### **Power lines and Firefighters**

The presence of power lines complicates wildland firefighting. The power lines themselves are hazardous to firefighters. NIOSH reports 10 firefighter deaths due to power lines between 1980 and 1999[6]. Hazards from power lines include ground gradient, energizing of conducting equipment, contact with line, solid stream water contact, and flashover through charged smoke. Reports of line-to-ground flashover in heavy smoke were made during the Eagle Eye fire in Arizona [9].

Firefighters are trained in these hazards, and therefore will tend to avoid activities near potentially live power lines. This creates an “indefensible space” near the line where it is less likely that firefighting will be conducted.

Sometimes, firefighting resources need to be diverted from other tasks to protect a critical power line. Examples of fires where this occurred are:

Pack Rat Complex (AZ) 9/2002 [8]

Yellow Jacket Fire (AZ) 7/2004 [11]

Cave Creek Complex (AZ) 7/2005 [10]

### **Power lines and Ramona Airspace**

Power lines are responsible for 6% of all helicopter accidents reported to the National Transportation Safety Board [13]. A Drug Enforcement Agency helicopter started the 2002 Pines fire when it struck a power line near Julian. As the pole heights are raised, the potential for interaction with low-flying aircraft will be significantly increased. This is true for all power lines everywhere, but this is a particular hazard in the Ramona area – which happens to be the only area where all the potential Powerlink routes converge.

Ramona generates several sources of low-altitude air traffic:

1. ***The CDF air attack base.*** CDF fire suppression aircraft need to make low altitude runs in order to drop their retardant payload. Increasing their altitude makes their attack less effective.
2. ***Experimental aircraft.*** Ramona is something of a Mecca for experimental aircraft enthusiasts [14,16,17] and hosts its own company headquarters for an experimental aircraft company [15].

3. **Helicopter training school.** The Silver State Flight School, headquartered at Gillespie Field, often makes runs near the Ramona Airport, and over other Ramona areas, including near the proposed power line routes [19]. These inexperienced pilots can often be seen flying at low altitudes.
4. **Marine Attack Helicopters.** The Sycamore Canyon substation is adjacent to the Marines' Miramar Air Station. While operation over backcountry areas are proscribed for low altitude flight, Marine attack helicopters have been seen by residents making low altitude attack runs over the areas east and north of the substation.
5. **Ultra-light Aircraft.** The one existing ultra-light base near Barona was destroyed by the Cedar fire and has not reopened [18]. However, the operators are currently searching for another location in the area.

This unusual combination of low altitude flight sources would tend to pose a greater hazard for power line collision than would normally be expected.

### **Power Line Fire Mitigation Problems**

It is possible to mitigate for the above risks, but the measures taken for fire risk mitigation only exacerbate other issues associated with the power line.

One method to reduce fire hazard along the line route is the removal of all fuel. This creates a wide swath of disturbed land, and significantly increases the ecological footprint of the project. This swath then becomes an attractive ingress for off-road vehicles, and a route by which non-indigenous and invasive species can be introduced.

Making the line more visible can reduce the risk to aircraft. The installation of lights on the towers or ornamentation along the line might reduce the risk to low-flying aircraft, but it greatly increases the visual impact of the project, thus further damaging view-sheds and reducing property values.

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### **References**

1. California Department of Forestry; 20 Largest California Wildland Fires (By Acreage Burned); <http://www.fire.ca.gov/FireEmergencyResponse/HistoricalStatistics/PDF/20LACRES05.pdf> ; 5/1/2005

2. California Department of Forestry; 20 Largest California Wildland Fires (By Structures Destroyed);  
<http://www.fire.ca.gov/FireEmergencyResponse/HistoricalStatistics/PDF/20LSTRUCTURES05.pdf> ; 5/20/2005
3. California Department of Forestry; CDF 2004 Fire Season Summary;  
<http://www.fire.ca.gov/FireEmergencyResponse/HistoricalStatistics/PDF/2004summary.pdf> ; May 2005
4. California Department of Forestry; CDF 2002 Fire Season Summary;  
<http://www.fire.ca.gov/FireEmergencyResponse/HistoricalStatistics/PDF/2002summary.pdf> ; Feb. 2003
5. California Department of Forestry; CDF 2001 Fire Season Summary;  
<http://www.fire.ca.gov/FireEmergencyResponse/HistoricalStatistics/PDF/2001summary.pdf> ; Mar. 2002
6. DHHS (NIOSH) Publication No. 2002-112; Fire Fighters Exposed to Electrical Hazards During Wildland Fire Operations;  
<http://www.cdc.gov/niosh/pdfs/hid15.pdf> ;
7. Beall, Frank C.; URBAN-WILDLAND INTERFACE FIRE: THE I-ZONE SERIES;  
<http://nature.berkeley.edu/~fbeall/XVIII/ignintro.htm> ;
8. Wildfire News; <http://www.wildfirenews.com/archive/091002.html> ; LIGHTNING FIRE SOUTH OF TUCSON AT 130 ACRES; 9/1/2002
9. Wildfire News; <http://www.wildfirenews.com/archive/080405.shtml> ; SEAT PILOT WALKS AWAY FROM CRASH; 7/7/2005
10. Wildfire News; <http://www.wildfirenews.com/archive/080405.shtml> ; BLACK LINE PROTECTS BLACK CANYON CITY; 7/2/2005
11. Wildfire News; <http://www.wildfirenews.com/archive/071704.shtml> ; SITUATION HEATING UP IN PHOENIX; 7/8/2004
12. California Department of Forestry, et al.; Powerline Fire Prevention Field Guide; 3/27/2001; <http://osfm.fire.ca.gov/powerline.html>
13. National Transportation Safety Board; NTSB Helicopter Accident Study;  
[http://www.nasdac.faa.gov/aviation\\_studies/ntsb\\_helicopter\\_accident\\_study/helicopter\\_accident\\_study.html](http://www.nasdac.faa.gov/aviation_studies/ntsb_helicopter_accident_study/helicopter_accident_study.html) ; April 2002.
14. North County Times; Dec. 24, 2005; Experimental Plane Crashes and Burns;  
[http://www.nctimes.com/articles/2005/12/25/news/inland/ramona/19\\_10\\_5312\\_24\\_05.txt](http://www.nctimes.com/articles/2005/12/25/news/inland/ramona/19_10_5312_24_05.txt)

15. Hornet Light Tandem Aircraft trainer kit;  
<http://www.flyhornet.com/>
16. Dee, John and Harry Abbot; <http://www.ez.org/tufting.htm> ;
17. Young Eagles of San Diego; <http://www.flyyoungeagles.com/> ;
18. Ultimate High Aviation; <http://www.ultimate-high.com/Locations.htm>
19. Evans, Jim; Helicopters over Ramona; Ramona Home Journal; 9/1/2005;  
[http://www.ramonajournal.com/news/2005/0901/Front\\_page/001.html](http://www.ramonajournal.com/news/2005/0901/Front_page/001.html)
20. Mitchell, Joseph W.; Brand Dilution; Wildfire Magazine; March 2005;  
[http://wildfiremag.com/ar/brand\\_dilution/index.htm](http://wildfiremag.com/ar/brand_dilution/index.htm)