BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

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OPENING BRIEF OF THE CIP COALITION

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This Opening Brief is filed jointly by AT&T California and New Cingular Wireless PCS (AT&T), LLC, the California Cable & Telecommunications Association, Comcast Phone of California, LLC, CoxCom, Inc. and Cox California Telcom LLC, CTIA-The Wireless Association®, Frontier Communications, the Small LECs,[1] Sprint-Nextel, Sunesys, LLC, SureWest Telephone, T-Mobile West Corporation, Time Warner Cable, tw telecom of california, lp and Verizon California Inc. (the "CIP Coalition").[2]

SUMMARY OF RECOMMENDATIONS

The CIP Coalition shares the Commission's desire to ensure that the State's communication and electric infrastructure continues to be constructed and maintained in a manner which mitigates the risk of fire. The Commission has before it a number of proposed rule changes to General Order (G.O.) 165 and G.O. 95 that emerged from the extensive workshops held in this docket. Some of those proposed rule changes received unanimous support from the workshop participants, and the CIP Coalition urges the Commission to adopt those consensus rules as set forth in Appendix A to the Workshop Report.

Other rule changes did not receive consensus and were instead put into the Multiple Alternative Proposal (MAP) process. Any contested rules the Commission adopts should thus reduce an identified fire safety risk and be supported by record evidence or refine or clarify rules already adopted in Phase 1 of this proceeding.

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[1] The Small LECs are the following carriers: Calaveras Telephone Company, Cal-Ore Telephone Co., Ducor Telephone Company, Foresthill Telephone Co., Happy Valley Telephone Company, Hornitos Telephone Company, Kerman Telephone Co., Pinnacles Telephone Co., The Ponderosa Telephone Co., Sierra Telephone Company, Inc., The Siskiyou Telephone Company, Volcano Telephone Company, and Winterhaven Telephone Company.

[2] Except where otherwise noted, each member of the CIP Coalition supports the discussion of each MAP in this brief.

For the reasons stated below, the CIP Coalition asserts that the following proposals all meet the criteria stated above and should be adopted:

- The CIP Coalition's MAP remedying structural problems in Rule 18A (relating to maintenance and repair), but keeping the core elements requiring corrective actions of nonconforming conditions and documentation of such actions;
- An inspection rule under Rule 31.2 focused on specified fire areas with reasonable inspection cycles that take into account the negligible risk profile of CIP facilities as provided for in the CIP 1 proposal or the CIP 2 proposal discussed below;[3]
- The use of the Reax Map, as proposed in CIP MAP 14, which provides a scientifically-based geographic delineation of high fire risk areas in Central and Northern California;
- A rule that establishes reasonable time frames for the exchange of information necessary to perform pole loading calculations, as proposed by the CIP Coalition through its MAP for Rule 44.1;
- A Rule 11 MAP clarifying that G.O. 95 applies to design and maintenance activities, in addition to construction activities;
- The Joint Electric Utilities'[4] proposal to provide clarification of the term "accepted good practice" as used in Rule 31.1; and,
- The IOU's proposal to remove inconsistency and inject reasonableness into Rule 48 by removing the impossible-to-meet "will not fail" standard.

In contrast, the proposals below should be rejected for they exceeding the scope of the proceeding and <u>not</u> specifically addressing fire safety and/or because there is no credible record evidence or support for the adoption of the proposed rule:

- San Diego Gas & Electric's (SDG&E) proposal to unnecessarily make additions to Rule 18A;

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[3] The two proposals represent different options for achieving these goals and each is supported by a different set of workshop participants. *See* Sections VI.B.1 and VI.B.2, *infra*, for a fuller discussion of these proposals and the rationale behind each.

[4] The Joint Electric Utilities will be referred to herein as the "IOUs," an acronym for investor-owned utilities.

- The Consumer Protection and Safety Division (CPSD) and SDG&E's proposal to arbitrarily impose G.O. 165 inspection types and cycles—meant to ensure electric utility service reliability—on CIPs for fire-risk mitigation purposes;

- CPSD's MAP that would require intrusive inspections of CIP poles that are *not* collocated with electric facilities;

- CPSD and Mussey Grade Road Alliance's (MGRA) proposal to create a new fire map for the entire State, an unnecessary and wasteful project in light of the Reax Map, and implementation of the FRAP map for Southern California;

- The IOUs' proposal to relegate to a potentially unenforceable appendix measures to ensure timely exchange of information needed to perform pole loading calculations;

- The IOUs' proposal to add a footnote to Table 2 of G.O. 95 that would unnecessarily create confusion and ambiguity;

- SDG&E's proposal to require marking of communication facilities, where SDG&E's internal administrative processes can and should resolve its concerns; and,

- CPSD and MGRA's proposal to require IOUs to report *all* fire incidents regardless of size or importance which is unnecessary and counterproductive.

The CIP Coalition also recommends that the Commission specifically allow a 12 to 18 month implementation period with regard to all contested rules, similar to the Phase 1 implementation period for patrol inspections. As to those rules that parties jointly offered as consensus rules, a 90-day implementation period should be sufficient.

I. INTRODUCTION

On August 25, 2009, the Commission issued a decision in Phase 1 of the Rulemaking, which, consistent with the scope of Phase 1, adopted a number of measures some that applied exclusively in areas defined in the decision as "Extreme and Very High Fire Threat Zones" in Southern California. A few of the Phase 1 measures, however, had statewide applicability. The measures adopted were

incorporated into specific rules found in either G.O. 95 or G.O. 165, or, in limited instances, were presented as directives in the ordering paragraphs of the Decision. Several of the measures were adopted on an interim basis, with the Commission directing further consideration by the parties in Phase 2.[5] As expressed by the Commission, "[i]n phase 2 of this proceeding, we will continue our review of fire hazards related to electric transmission and distribution lines and related communication facilities and consider *additional measures to address fire safety* on a statewide basis."[6]

The CIP Coalition shares the Commission's desire to ensure that the State's communication and electric infrastructure continues to be constructed and maintained in a manner which mitigates fire risk and have actively participated in this Rulemaking with that underlying purpose in mind. The CIP Coalition proposed additional refinements or clarifications to existing rules addressing: (1) inspections (Rule 31.2); (2) resolution of safety hazards and maintenance (Rule 18A); and (3) pole loading and cooperation (Rule 44). In each of these areas, the CIPs' proposed rule changes (PRCs) or alternatives to the PRCs (MAPs)[7] are designed to promote the goal of this proceeding, to reduce potential fire hazards related to CIP facilities in close proximity to overhead power lines.

In contrast, there were other PRCs that strayed far afield from the Commission's delineated parameters for this proceeding because they do <u>not</u> specifically address fire safety and/or there is no credible evidence or support for the adoption of the proposed

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[5] *See, e.g.,* Decision 09-08-029, at 11 ("Some of our measures are designated as interim. We expect to address the future applicability of such interim measures in phase 2.").

[6] *Id*. at 2 (emphasis added).

[7] The protocols followed during the workshops allowed participants to offer alternatives to the PRCs originally offered on December 16, 2009. Since multiple such alternatives were allowed, the protocols refer to alternatives as "Multiple Alternative Proposals" or MAPs. Here, the CIP Coalition refers

(footnote continued)

rule. In a number of instances, certain parties have proposed significant new rules without providing any valid scientific analysis or technical basis to support them. The members of the CIP Coalition were the only parties that provided any expert or scientific analysis of available historical fire data or utility facilities to determine relative fire risks and how best such risks may be reduced. In Phase 1, AT&T retained Exponent Failure Analysis Associates (Exponent) to conduct a technical analysis and evaluation of fire risks associated with CIP facilities on joint use poles. Exponent conducted a thorough and objective analysis of all publicly available databases regarding fires associated with utility facilities, including all available data regarding such fires in California and nationwide. It also searched and assessed published technical literature and conducted an engineering review of CIP facility failure modes that could potentially cause or contribute to wildland fires. Based upon this thorough, objective and scientific analysis, Exponent concluded that fire risks associated with CIP facilities are negligible.[8] In Phase 2, certain CIP parties also retained Reax Engineering, Inc. (Reax) to assess fire threats in different geographic areas of the State for the purpose of addressing known deficiencies in the CalFire FRAP maps. Reax completed this analysis, taking into account additional data and factors not considered in the FRAP maps, including historical data regarding significant wind events in California, and prepared a much more detailed fire threat map for Central and Northern California based upon more thorough and rigorous scientific analysis. The CIP Coalition's proposals were developed and are fully supported by this expert technical analysis.

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to the alternative PRCs that workshop participants voted on as a "MAP."

[8] *See* Exponent Report, Opening Comments of AT&T in Phase 1 (March 27, 2009), Attachment A, Larry W. Anderson, *Study to Assess Fire Risk Associated with Collocated Communications Equipment (Wired Telephone Lines and Wireless Equipment) With Utility Power Lines on Poles* (March 27, 2009).

No other party offered any technical or scientific analysis in support of their proposals, except SDG&E and its expert analysis was limited to one MAP pertaining to Rule 48 material strength requirements.[9] This deficiency was most obvious and troubling in regard to the proposals of CPSD and SDG&E concerning CIP inspections. CPSD and SDG&E propose extending the inspection requirements contained in G.O. 165, currently applicable only to electric utilities, to CIPs. The requirements in G.O. 165 were, however, adopted to address concerns regarding electric system reliability not fire safety. The Commission has had over a decade of experience with G.O. 165, yet no party offered any statistical analysis of the effect, if any, of the inspection rules in G.O. 165 on the number or severity of wildland fires caused by electric facilities since they were adopted.

At best, the adoption of these proposals, discussed in more detail below, will lead to costly programs that are unlikely to further the goal of this proceeding—i.e., mitigation of fire hazards. Such proposals do not benefit any stakeholder—not fire victims, not ratepayers, not the utilities, and not the Commission. As a policy matter, the Commission should not adopt MAPs that do not focus on fire threat areas to ensure that limited resources are not diverted from the important goal of this proceeding—fire risk mitigation.

II. OVERARCHING PRINCIPLES FOR CONSIDERATION OF PROPOSED RULES AND ALTERNATIVES

The Phase 2 Scoping Memo sets forth the overarching principle by which all proposed rules and MAPs must be examined: "to consider measures to reduce the fire

[9] At the Workshop of March 24, 2010, SDG&E's expert, EDM, presented technical analysis regarding Rule 48.

hazards associated with utility facilities."[10] Accordingly, if the implementation of a contested proposed rule or alternative will not demonstrably contribute to the reduction of fire hazards associated with utility facilities, then it should be rejected outright unless there is a consensus to adopt a rule.

This principle is one which all the parties to this proceeding recognized, but, as discussed below, did not always follow.[11] In its assessment of the proposed rules, the Commission must adhere to the determined scope of this proceeding, as noted in ALJ Kenney's August 11, 2010 Ruling Granting CPSD's Motion to Exclude and should not adopt contested rules which do not *demonstrably* reduce fire risk.[12] Moreover, the Commission must base its conclusions on record evidence that identifies the fire hazard addressed by any proposed rule, as well as evidence regarding how the proposed rule mitigates the identified fire hazard.[13] Absent such evidence, adopting rules for the stated purpose of reducing fire hazards would be arbitrary and capricious, lack any foundation and lead to legal as well as policy errors.[14]

III. JURISDICTION ISSUES

The CIP Coalition is not taking a position on these issues.

IV. ELECTRIC TRANSMISSION ISSUES

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[10] Phase 2 Scoping Memo, at 8.

[11] *See e.g.*, Sections VI.B.3 and VI.B.4, *infra*.

[12] As ALJ Kenney noted, considering issues not set forth in the Scoping Memo would render the Scoping Memo "pointless, and the intent of the Legislature in requiring Scoping Memos would be defeated." Administrative Law Judge's Ruling Granting Motion to Exclude Proposed Rule Changes Concerning Utility Liability from Phase 2 and The Phase 2 Workshop Report, R.08-11-005 (August 11, 2010) at 4.

[13] Phase 2 Scoping Memo, at 11.

[14] Commission decisions in rulemaking proceedings must be supported by findings pursuant to Cal. Pub. Util. Code § 1757.1. The findings themselves must be based on record evidence. Otherwise, they are arbitrary and capricious and subject to judicial review. *Id*.

The CIP Coalition is not taking a position on these issues.

V. PROPOSED CONSENSUS RULES

As part of the workshop process undertaken in this proceeding,[15] the parties participating in the workshops unanimously supported a number of proposed rules. These consensus proposals are set forth in Appendix A to the Workshop Report, along with detailed rationales and justifications supporting their adoption by the Commission. The members of the CIP Coalition either voted in favor of, or neutral with respect to, each of the consensus proposed rules. For the reasons set forth in the Phase 2 Workshop Report, the CIP Coalition continues to support the adoption of these rules by the Commission.

VI. MULTIPLE ALTERNATIVE PROCESS PROPOSALS

As is explained in the Summary of Recommendations, the CIP Coalition urges the Commission to adopt the MAPs it proposed in a number of key areas including inspections, maintenance and repair, fire maps and pole loading. The MAPs offered by the CIPs in each of these areas, reflect CIPs' good faith efforts to address the stated purpose of the OIR (the promotion of fire safety) and refine or clarify proposals from Phase 1. Conversely, the CIP Coalition urges the Commission to reject a number of proposals proffered by other parties not related to the purpose of this proceeding, that are arbitrary—unsupported by any credible record evidence—or unnecessary and/or which would have significant (and perhaps unintended) negative results.

The following section sets forth a detailed discussion of each of the alternative proposals and the reasons why the Commission should or should not adopt the

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[15] Phase 2 Joint Parties' Workshop Report for Workshops held January–June 2010, R.08-11-005 *(footnote continued)*

changes. Section VI starts with a discussion of the MAPs initially proposed by the CIP Coalition (Sections A-D), and then discusses MAPs proposed by other parties (Section E-J).[16]

A. MAP No. 3—General Order 95, Rule 18A: The Commission Should Adopt the CIP Coalition's Rule 18A and Reject SDG&E's Alternative.[17]

The CIP Coalition's proposed Rule 18A MAP is the result of extensive compromises with CPSD and all the other parties participating in the workshops and thus, the CIPs' MAP of Rule 18 achieved near unanimity of votes. The only party to vote against this MAP was SDG&E and even it, by virtue of its MAP to Rule 18A, generally agrees with the CIP Coalition's Rule 18A MAP. In fact, as SDG&E acknowledges, its alternative MAP is "the same as the Rule 18A proposed by the CIP Coalition in every respect, save one."[18]

The CIP Coalition's proposed changes to Rule 18A maintain the core elements of the existing rule adopted in Phase 1; i.e., the obligation to take corrective action and establish auditable maintenance programs on timelines based upon three priority levels, which in turn take into consideration specified factors. Among others, the CIP Coalition's proposed Rule 18A MAP retains the following:

- The obligation to perform corrective action
- The record keeping obligation (streamlined)

(August 13, 2010) (Workshop Report), at 4-7 (detailing workshop procedures).

[16] The CIP Coalition does not here discuss every MAP parties offered as some relate to IOUs or publicly-owned utilities only, and have no implications for CIPs.

[17] Cox has abstained from taking a position on this MAP and, as a result, does not join in this section of the CIP Coalition brief.

[18] Phase 2 Workshop Report at B-41. *See also* Phase 2 Workshop Report at B-33 ("SDG&E generally supports this PRC for the reasons set forth in the CIP Coalition's rationale.").

- The requirement to have an auditable maintenance program
- The factors on which priorities must be based
- The three levels of priorities for taking corrective action
- Flexibility to prioritize maintenance activities in the three levels to maximize efficiency
- The exceptions to the priorities
- The ability of electric utilities with auditable inspection and maintenance programs established under G.O. 165 to continue to rely on those programs.

The changes in the CIP Coalition's Rule 18A proposal are made largely to streamline and fix structural problems with the existing rule to allow workable operationalization and to remove conflicting, unnecessary and redundant provisions that cause confusion or otherwise increase costs. The MAP also eliminates duplicative, vague and/or unnecessary obligations in the current rule. Many of the workshop participants agreed that Rule 18A needed to be fixed. As PG&E's statement in the Workshop Report notes, the Phase 1 Rule 18A was "confusing and poorly written, and needed clarification in order for parties to implement the requirements."[19] The changes in the CIP Coalition MAP Rule 18A are designed to remedy these problems, and significantly ***all*** of the changes which refine and clarify the Rule 18A obligations enjoy the unanimous support of all workshop participants—including SDG&E. In fact, as noted above, SDG&E's proposal for Rule 18A is exactly the same as the CIP Coalition's with an exception of some new language SDG&E would add to one of the Priority Levels for corrective action.

[19] Phase 2 Workshop Report at B-32.

As currently written Rule 18A has three priority levels for taking corrective action: (1) Level 1, which requires "immediate" action to repair an "immediate safety or resultant risk with a high probability for significant impact;" (2) Level 2, which requires repair in 0-59 months for conditions of variable high to low risk; and (3) Level 3 which requires repairs "as appropriate" (with no specified timeline) for conditions which present "acceptable risks." SDG&E's proposal had the exact same three priority levels; however SDG&E would add the following language to the Level 2 priority:

> Time period for correction to be determined at the time of identification by a qualified company representative, but not to exceed: (1) 12 months for non-conformances that compromise worker safety, (2) 12 months for non-conformances that create a fire risk and are located in an Extreme or Very High Fire Threat Zone in Southern California, and (3) 59 months for all other Level 2 nonconformances.[20]

As a matter of sound public policy, the Commission should reject inclusion of another timeframe *within* a time-delimited priority level because it is unnecessary and adds a level of complexity that confuses rather than clarifies priorities.

As an initial matter, SDG&E's version of the MAP with its additional time frames for the particular undefined situations described above is unnecessary because CIPs must already prioritize corrective actions that are a "Level 2" priority commensurate with the risk observed by field technicians. Moreover, as CPSD explained in the workshops, how a CIP prioritizes such risks and proposes to address them must be set forth in a company's auditable maintenance program. Thus, the fact that the "Level 2" priority has a range of 0-59 months does not mean that a CIP can wait to repair every Level 2 Safety Hazard or non-conformance for 59 months. What amount of time is appropriate will depend on the level of risk and other factors specified in the rule.

In addition, SDG&E's proposed additional timelines for corrective actions are problematic because they hinge on two vague criteria—whether a safety hazard or nonconformance "compromise[s] workers safety" or "create[s] a fire risk." These terms are so broad that they could be interpreted to encompass any alleged nonconformance and would require corrective action within 12 months—thereby eliminating the flexibility that the a 0-59-month range was meant to afford in the first place.

This lack of flexibility is not just an inconvenience for the companies that have to comply. SDG&E's additional provision also hinders the ability of field technicians to prioritize conditions based on fluctuating local conditions and available resources and, thus, may create a larger safety issue than it seeks to correct. The problem with this lack of flexibility is underscored by the fact that no rule imposes the same rigidity or timeframe on the correction of hazards associated with the IOUs' facilities. Indeed, SDG&E's MAP adds complexity and limitations to the Level 2 priority not imposed on IOUs in G.O. 165 and not found in the Memorandum of Understanding between CPSD and SCE from which CPSD copied the priority levels in the first place.[21]

Finally, claims by both SDG&E and LA County that the CIP Coalition's proposed Rule 18A MAP increases from 30 days to 5 years the time to take corrective actions of Safety Hazards are merely a red herring.[22] The CIPs' Proposed Rule 18A MAP addresses the concern by assigning as a Level 1 Priority any "immediate safety and/or reliability risk with high probability for significant impact." The CIPs' Rule 18A MAP

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[20] Phase 2 Workshop Report at B-41.

[21] For its Phase 1 PRC, CPSD selected the priority levels and timeframes (including the 59-month period in Phase 1 Rule 18A) from the SCE-CPSD MOU resulting from I.01-08-029 and D.04-04-065. *See* Phase 1 Workshop Report at 49.

[22] *See* Phase 2 Workshop Report at B-42 (SDG&E) and B-45 (LA County).

defines “Safety Hazard” as any “condition that poses a significant threat to human life or property.” Therefore, a Safety Hazard that also poses an immediate risk with a high probability for impact would appropriately be addressed immediately, not within 59 months or within 12 months or even 30 days.

Edits and modifications to the CIP Coalition’s original PRC persuaded nearly all the parties to vote “yes” on this MAP, including CPSD. And even though SDG&E voted “no” on the CIP Coalition proposal, SDG&E stated in the Phase 2 Workshop Report that it generally supports the CIPs’ proposed Rule 18A MAP.[23] The MAP thus reflects a near-consensus rule, and the Commission should adopt it.

B. MAP No. 6—General Order 95, Rule 31.2: The CIP Coalition Members Have Sponsored Two Separate Proposals Providing for Regular, Auditable Inspections of CIP Facilities in Specified Fire Threat Areas.[24]

The Commission commenced this proceeding to consider revising and clarifying regulations designed to mitigate the potential for wildland fires caused by electric utility transmission or distribution lines, or CIP "facilities in proximity to such lines."[25] As noted above, the Scoping Memo directed the parties "to consider measures to reduce the fire hazards associated with utility facilities.”[26] In addressing any of the proposed rules for inspection of CIP facilities, it is imperative that this Commission directive be kept in mind. Doing so highlights the fact that **no party introduced empirical evidence supporting the notion that communication lines or wireless equipment contribute**

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23 *See* Phase 2 Workshop Report at B-33.

24 Cox has abstained from taking a position on this MAP and, as a result, does not join in this section of the CIP Coalition brief.

25 OIR, at 1.

26 Phase 2 Scoping Memo, at 8.

in any material way to fire risk. Thus, the need for an inspection rule governing CIP facilities simply has not been established.

Nonetheless, the Commission decision in Phase I of this proceeding imposed a specific—and interim—inspection obligation on CIPs by requiring implementation of *patrol* inspections of their facilities in designated "extreme and very high fire threat zones" in Southern California as identified in Cal Fire's Fire and Resource Assessment Program Fire Threat Map (FRAP Map), by September 30, 2010.[27] The Phase 1 Decision anticipated adoption of a permanent CIP inspection rule in this Phase 2.

For this reason (and notwithstanding the lack of evidence) the CIP Coalition, as reflected in its December 16, 2009 filing, proposed a PRC consistent with the inspection requirements already approved and adopted by the Commission in Phase 1 of this proceeding.[28] In this regard, the CIP Coalition proposal focused on patrol inspections in the extreme and very high fire zones *throughout the State*.

The difficulty, however, of fashioning a permanent CIP inspection rule to address unspecified fire risks became readily apparent as parties struggled with the undertaking, devoting considerable time and resources to this effort over an eight-month period. As part of this undertaking, the CIP Coalition attempted to amend its original PRC to reach a consensus proposal. When it became apparent that it simply was not possible to create a CIP inspection rule supported by all parties in the proceeding, the CIP Coalition divided into two groups on this proposed MAP. One group supports a proposed rule that is essentially the same as the original proposal offered by the CIP Coalition as it

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[27] *See* D.09-08-029 at Ordering Paragraph No. 1.

[28] See Proposed Rule Changes of CIP Coalition, R. 08-11-005 (December 16, 2009), Appendix A, pp. 2-3.

adheres most closely to the inspection requirements already approved by the Commission on an interim basis in Phase 1 and offer the CIP 2 MAP.[29] The other group believes that CIP 2 is appropriate for Commission adoption, but also continues to support their version of the CIP Coalition inspection PRC which was altered to a certain degree as a result of the attempt to reach consensus with other parties (CIP 1).

The upshot is that as a result of the workshop process, the CIPs have presented the Commission with two inspection proposals for its consideration. Each of these proposals (CIP 1 and CIP 2) establish state-wide, auditable inspection programs in fire risk areas with regular inspection cycles, although they vary in the specifics of those requirements. In brief, CIP 2 provides for patrol inspections on a five-year cycle in specified high risk fire zones throughout the State while CIP 1 provides for patrol inspections on a three-year cycle and detailed inspections on a nine-year cycle in those same specified high risk fire zones. In all other ways, the proposals are essentially identical. The respective rationales and specific provisions of each are discussed separately below.

1. The CIP 2 MAP Correctly Focuses on Statewide Patrol Inspections in Specified Fire Threat Areas.

The proposed Rule 31.2 MAP by AT&T, Frontier Communications and the Small LECs (CIP 2 MAP) is designed to address the directive in Ordering Paragraph No. 1 of D.09-08-029 that the Commission consider adoption of a CIP inspection rule consistent with the scope of this proceeding. Rather than guess at what may or may not be appropriate to address an unidentified risk, the CIP 2 MAP (1) properly focuses

[29] CIP 2 is sponsored is sponsored by AT&T, Frontier Communications and the Small LECs. CIP 1 is sponsored by CCTA, Comcast, CTIA, NextG, Sprint Nextel, Sunesys, Time Warner, T-Mobile, tw telecom and Verizon.

inspection efforts on the extreme and high risk fire zones in the State, (2) provides for reasonable inspection cycles that have the potential benefits of promoting the Commission's (and carriers') interests in reducing or eliminating fire hazards related to CIP facilities (if any), and, thus, (3) responsibly permits carriers to detect Safety Hazards in those zones in a cost-effective manner.

The CIP 2 MAP parallels the inspection requirements already approved and adopted by the Commission in Phase 1 of this proceeding. In Phase 1, the Commission considered the type of inspection to be performed by CIPs with respect to fire safety, and required the following:

- Communications Infrastructure Providers shall begin performing patrol inspections of their facilities in designated Extreme and Very High Fire Threat Zones as identified in Cal Fire's Fire and Resource Assessment Program Fire Threat Map, in the following Southern California counties: Santa Barbara, Ventura, Los Angeles, Orange, San Diego, Riverside, and San Bernardino…

- The Communication Infrastructure Providers' patrol inspections shall encompass all of their overhead lines installed on joint use poles with electric distribution or transmission facilities, as well as those facilities that are one pole length away from joint use poles with electric distribution or transmission lines in the designated areas…

- "Patrol inspection" shall be defined as a simple visual inspection of applicable communications infrastructure equipment and structures that is designed to identify obvious structural problems and hazards. Patrol inspections may be carried out in the course of other company business.

- Maintenance of documentation which would allow Commission staff to verify that such inspections and corrective actions were completed, including the location of the poles/equipment inspected, the date of inspection, and the personnel that performed the inspection and corrective action, retained for five years.

The CIP 2 MAP incorporates each of these four elements. First, the CIP 2 MAP requires the same type of inspection to be done: patrol inspections. Second, the patrol inspection definition is identical to that adopted in Phase 1. Third, the limitation to

specified fire areas maintains the original geographic description identified in Phase 1 for the seven identified counties in Southern California, and adds extreme and very high fire zone areas for Northern and Central California based on the Reax Engineering map developed in Phase 2.[30] Fourth, the proposal maintains the record-keeping requirement.

The CIP 2 MAP would require patrol inspections every five years in specified high fire risk areas set out in the CIPs' mapping proposal (MAP 14), with no detailed inspections. It incorporates all of the inspection requirements set forth in Ordering Paragraph 1 of the Phase 1 Decision; no new evidence was introduced in Phase 2 to cause the Commission to revise these requirements. Patrol inspections are adequate for CIP facilities, as detailed inspections are inappropriate and unnecessary from both operational and fire prevention perspectives. The CIP 2 MAP strikes the proper balance between an effective fire risk prevention scheme for CIP facilities, while not burdening California consumers with excessive and unnecessary costs.

a. Any Inspection PRC Must Be Based on the Reality That There is Little Wildfire Risk Associated with Communications Facilities.

The risk of wildfires due to CIP facilities placed in close proximity to electric power lines has been determined by fire experts in this proceeding to be negligible compared to the fire risks of electric power lines.[31] This evidentiary fact—presented in the record through an expert witness—was not refuted by any evidence in either phase of this proceeding. While electric power lines are uninsulated, electrified (14kV to

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[30] *See* discussion of fire maps in Section VI.C., *infra*.

[31] *See* Opening Comments of AT&T in Phase 1 (March 27, 2009), Attachment A, Larry W. Anderson, *Study to Assess Fire Risk Associated with Collocated Communications Equipment (Wired Telephone Lines and Wireless Equipment) With Utility Power Lines on Poles* (March 27, 2009) (the "Exponent Report").

69kV), mounted near the top of wood poles, and capable of being a source of fire ignition, CIP facilities are insulated and have low voltage.

Exponent conducted a review of general fire and fire incident literature and found several sources of data that document wildland fires. First, Exponent examined the National Fire Incident Reporting System ("NFIRS") Database and found there is no evidence that CIPs' aerial equipment cause wildland fires.[32] Second, Exponent analyzed Cal Fire's data regarding wildland fires in California and found that the most prevalent causes of wildfires in 2006 according to that data were equipment use (30%), vehicles (12%), arson (12%), and debris burning (7%). Furthermore, the data from Cal Fire do not identify CIP aerial facilities as the cause of any historical fires. Thus, available historical data do not provide any basis for concluding that CIPs aerial facilities cause fires.[33]

Exponent also conducted a Hazard Analysis to evaluate the fire risk factors for (1) hypothetical scenarios involving poles with only electric facilities attached, (2) hypothetical scenarios involving poles with electric and communication wireline lines attached, and (3) hypothetical scenarios involving poles with electric facilities and wireless specific equipment attached. All these hypothetical scenarios assume there is some type of failure or accident involving the equipment on jointly-owned poles resulting in the ignition of vegetation or other nearby combustibles. The scenarios were all evaluated in terms of the risk of fire in a wildland area. Each scenario was assigned a

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[32] *Id*. at 15.

[33] *Id*. at 28.

risk rank from one to four, with one being the highest risk. From the Hazard Analysis, Exponent concludes that the contribution of communication lines/wireless equipment to fire risk is “negligible.”

The evidence in this record refutes CPSD’s unproven hypothesis that CIP aerial facilities pose a fire risk level that requires mitigation through means comparable to those applicable to electric utilities. Furthermore, the Hazard Analysis highlights that any potential benefit of fire-safety rules imposed on CIPs is not likely to significantly reduce fire risks because CIP lines have a negligible incremental risk as compared to the risks associated with electric lines.

Accordingly, any inspection proposal the Commission adopts for CIPs must necessarily recognize the fundamental difference in the nature of electric and telecommunications facilities, and the significant difference in fire risk relative to those facilities. The Commission’s Phase 1 decision appropriately recognizes this difference; the CIP Coalition urges the Commission to rely upon that distinction in adopting a permanent inspection rule.

b. Detailed Inspections are Unnecessary.

The CIP 2 Proposal, consistent with the Commission's decision in Phase 1, does not order detailed inspections of CIP facilities in the seven extreme and high fire zones in the seven identified counties in Southern California, in spite of other parties' arguments that the Commission should do so. Detailed inspections are inappropriate and unnecessary for communications facilities, because there is no evidence that such inspections are essential or even helpful in reducing the risk of fire.

Detailed inspections for electric utilities facilities are appropriate because they are warranted by the nature of those facilities. Electric utilities have had some form of

voluntary periodic testing and detail-type inspection of their distribution systems in place long before the Commission adopted uniform and prescriptive inspection standards in G.O. 165.[34] These detail-type inspection and maintenance activities were not mandated to address fire risk, but instead were operationally necessary to promote reliable, safe and cost-effective operation of the electric distribution and equipment. The Commission's adoption of new and prescriptive performance standards for electric utilities (in I.95-02-015) and set forth in G.O. 165 "were designed to promote high quality service and a distribution system that is safe and reliable for the public."[35] The Commission affirmed that the standards it adopted would in the long run be cost-effective because the type of inspection "program improvements would represent investments which will pay off over the coming years by requiring fewer facility replacements, timely and more cost effective maintenance obtained through the observation of facilities' condition, reduced liability, and improved system reliability."[36] These G.O. 165 rules and the Commission's justification for them makes clear that the purposes of detail inspection for electric utilities were uniquely driven by the desire for reliable electric service and necessitated by the nature of the electric distribution systems.[37]

Unlike electric utilities, CIPs have never had a Commission requirement or operational need for detail inspections of overhead facilities and equipment mounted on joint use wood poles. This is because most CIPs' outside facilities, such as

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[34] *See* D.96-11-021, Section B: Utility Inspection and Maintenance Plans.

[35] D.96-11-021, 1996 Cal. PUC LEXIS 1145 at *16.

[36] *See* D.96-11-021, Section III. Proposed Distribution Inspection Standards.

[37] *See* Section VI.B.3.b, *infra*, below for a full discussion of the Commission's reasons for adoption of G.O. 165.

communication cables and splice boxes mounted on wood poles, do not carry high voltage or high amperage or require detail-type periodic inspection to operate safely. As a result, communications facilities simply do not raise the same concerns about fire risk as do electric facilities. In short, patrol inspection for communications facilities is sufficient given the negligible wildfire risk CIPs' facilities introduce in wildfire prone areas.

c. Patrol Inspections on a Five-Year Time Cycle Are More Than Adequate To Address the Negligible Fire Risk Posed by CIP Facilities.

CIP 2 retains the patrol inspections that were required by the Phase 1 decision. However, CIP 2 adds an element for CIP inspections that was not resolved in Phase 1, namely, an ongoing, periodic time cycle for inspections. Phase 1 specified that the first round of inspections required by OP 1 should be completed by September 30, 2010, thus leaving for Phase 2 the issue of how frequently patrol inspections should occur after September 30, 2010. The CIP 2 MAP proposes that inspections occur every five years. A five-year cycle is appropriate given the negligible fire risks posed by these facilities, the presence of other CIPs on the same joint use poles, the Commission's requirement of notification of safety hazards, and the requirement of an auditable maintenance program.

As previously explained, the fire risk associated with CIP facilities on joint poles is negligible. There is no evidence that inspection of such facilities significantly decreases the risk of fires, and no evidence was submitted in Phase 2 of the proceeding that would suggest otherwise. Moreover, joint use poles in extreme and very high fire zones will be inspected more frequently than the five-year interval the CIP 2 MAP suggests because the same joint use poles are also subject to patrol inspection by one,

if not more, collocated CIPs**.** The redundancy of inspections must be considered as a whole to optimize costs of inspection to consumers and utilities.

Furthermore, Rule 18 (Part B) already imposes an obligation on all collocated electric and communications utilities to notify each other within 10 business days when they discover a safety hazard on or near a communication or electric facility during their inspections**.** Moreover, the CIP 2 MAP supplements existing inspection of CIPs' facilities which occur during the course of their normal operations and which involve thousands of truck rolls each day to urban and rural areas within their service territories. Thus, for the reasons discussed above, the proposed CIP 2 inspection interval of five years provides a more than adequate cycle of inspection to reduce the negligible fire risk associated with communications facilities.

d. The CIP 2 MAP Properly Limits the Inspection Areas to the Highest Fire Threat Zones Set Forth in the Reax Maps for Central and Northern California.

Given the nature of CIP facilities and their perceived wildfire risks, mandatory and programmatic inspection of CIPs' facilities should be focused on and limited to delineated wildfire risk zones. No other credible reasons related to safety or reliability have been advanced in connection with CIPs' facilities that justify a specific schedule for inspection of CIPs' facilities located outside of generally known fire risk areas. Consistent with Phase 1 of this proceeding, the language in the CIP 2 MAP delineates between Southern and Northern/Central California by defining "Specified Fire Areas" for the former as the Very High and Extreme Fire Threat Zones as identified in the FRAP Map, while defining "Specified Fire Areas" for the latter consistent with the two highest threat zones identified on the Fire Threat Map prepared in this Phase 2 by Reax

Engineering.[38] Allowing the CIPs to focus their inspections on the areas of highest relative fire threat in turn will allow for more targeted and cost-effective CIP inspections.

e. Any Inspection Requirements Above Those Recommended in the CIP 2 MAP Would Impose Costs That Outweigh Benefits to California Consumers.

The CIP 2 MAP acknowledges an important element that is not addressed by the majority of the other inspection MAPs—the costs associated with the elements of such inspections. The "sky's the limit" mentality that appears to have been adopted by parties such as CPSD and SDG&E disregards the real costs of implementation and operationalization of the inspection programs they are proposing. AT&T, Frontier Communications, the Small LECs and Verizon have examined the costs of such proposals and are willing to absorb the costs associated with the CIP 2 MAP proposal—costs which are already considerable—to support the adoption of a permanent inspection rule. However, the costs associated with the inspection rules proposed by the other parties are simply unjustified and unreasonable.

Moreover, whatever speculative and minimal benefit may flow from such proposals does not outweigh the large costs to California consumers. CIP 2 proponents believe that any inspection requirements above existing practices are unwarranted, and costs associated with new requirements would be in addition to CIPs' existing operational costs to maintain their aerial infrastructure including system development costs, required equipment and tools to perform the inspections, and any associated administrative costs. However, compared to any other proposal before the Commission, these CIPs believe CIP 2 best balances the costs and benefits of the

[38] This issue is discussed in Section VI.C., *infra*.

inspection requirement. Unlike the electric utilities participating in this proceeding, most of the CIPs are not rate-of-return regulated. Thus, the costs will either be absorbed by the CIPs, passed on to customers through a line-item charge on bills as allowed by the Phase 1 Decision, or for the Small LECs, ultimately passed onto ratepayers in some manner through their rate designs established in their rate cases.

AT&T has done a preliminary cost-feasibility analysis of CPSD's Rule 31.2 MAP. Based on this analysis, AT&T has estimated the costs for this proposal to be over $18 million per year for AT&T alone. This estimate is incremental to AT&T's existing operational costs to maintain its aerial infrastructure and is exclusive of system development costs, required equipment and tools to perform the inspections and any associated administrative costs. The imposition of these costs is not merited given that there has not been any evidence submitted that the imposition of CPSD's inspection rule would decrease fire hazards associated with CIP facilities.

Verizon has performed a preliminary cost estimate also and found that CPSD's proposal would lead to an approximately 40-fold increase in costs as compared to implementation of the CIP 2 MAP. Similar to AT&T and Verizon, Frontier has also done a preliminary cost-feasibility analysis of CPSD's Rule 31.2 MAP. Frontier is a mid-sized rural and semi-rural provider with approximately 155,000 lines, yet the estimated additional expense is estimated to be over $1.5 million per year for its company alone. Frontier's service territory covers a large geographic area which includes many rugged and challenging to reach areas. This estimate is incremental to Frontier's existing operational costs to maintain its aerial infrastructure, including adherence to current G.O. 95 standards. The additional resources required to perform the inspections and

any associated administrative costs is not justified since there is not any proven evidence to suggest that this proposal will decrease fire hazards associated with CIP facilities and certainly not in Frontier's service area.

Unlike the majority of the CIPs, the Small LECs consist of small local exchange carriers serving rural areas of California, mostly in locations in the Sierras in Northern California. The Small LECs range in size from approximately 300 to approximately 20,000 customers. The Small LECs have large numbers of poles in rural areas, and if they are forced to operationalize pole inspections on a statewide basis—regardless of whether they are even near joint use poles, and regardless of whether they are in urban versus rural areas—it will be a massive undertaking. Each Small LEC would have to "hire up" to determine how to implement such a massive system and operationalize it in locations that are sometimes inaccessible and have no proven connection or threat of fires.

Although the Small LECs appreciate and support the interest in a uniform, targeted fire safety program for joint poles, the Commission must keep in mind that all CIPs are not the same. Given that they are rate-of-return regulated, the Small LECs have no choice but to pass cost increases on to ratepayers. Each and every cost that will be imposed by the inspection rules will ultimately be borne by their customers. The inspection rules suggested by other parties, without limitation, would be *inordinately burdensome* on carriers such as the Small LECs with smaller number of customers. While complying with these additional inspection requirements would generate significant additional costs, there will be no increased safety, no targeted inspections where the fire threat is more likely, and little if any effective ability to implement these

rules in rural locations such as where the Small LECs operate. It is both unreasonable and unfair to the Small LECs to adopt any other proposals.

f. Conclusion.

As detailed above, the CIP 2 MAP strikes a proper balance between the benefits to California consumers and the costs associated with the fire inspection rules that must be implemented. Accordingly, CIP 2 is supported by the CIP Coalition and we encourage its adoption by the Commission.

2. CIP 1 Appropriately Maintains the Focus of Inspections on Areas with Fire Threats.

CIP 1, proposed by CCTA, Comcast, CTIA, NextG, Sprint Nextel, Sunesys, Time Warner, T-Mobile, tw telecom and Verizon, resulted from the efforts of the CIP Coalition to strike a balance between the positions advanced by other parties as to the elements of the CIP inspection rule and the clearly delineated scope of this proceeding for the purpose of creating an inspection rule that is appropriately focused on fire safety concerns. In general, it refines and expands the interim rule adopted in Phase 1, in accordance with the Phase 2 Scoping Memo, to provide for auditable inspections of facilities *throughout the State in high fire risk areas*, establishes a *reasonable inspection cycle* for those inspections and *imposes a detailed inspection* requirement to supplement the patrol inspection requirement.

In particular, CIP 1 modifies the original PRC offered by the CIP Coalition to address certain parties' concerns by reducing the proposed time cycle for the "patrol" inspection cycle for CIP facilities located on supply poles or that are one pole length away from five years to three years and to include a "detail" inspection cycle on those

same facilities.[39] Like the original CIP proposal, CIP 1 retains focus on high fire areas of the State.

Although it did not achieve consensus, there was support for CIP 1 from a broad spectrum of interests represented at the workshops, including from two of the three largest IOUs, several municipally-owned electric utilities and a wide range of CIPs (some ILECs, CLECs, wireless providers and cable companies). In addition, DRA was not opposed to CIP 1, voting neutral on its adoption.[40] Evidence that CIP 1 strikes a reasoned balance is found in the statements submitted by third parties in the Workshop Report. Thus, the California Municipal Utilities Association (CMUA) states its belief "that this PRC represents a reasonable compromise of the various positions articulated by the parties during the Phase 2 workshops."[41] Similarly, PG&E supports CIP 1 as a "reasonable approach" to the CIP inspection obligations.[42]

Statements of opposition to CIP 1 were submitted by three parties: CPSD, SDG&E and LA County. CPSD's and SDG&E's primary objection to CIP 1 is that "it is too limited in geographic scope."[43] In other words, CPSD and SDG&E object that the rule does not apply to all joint poles regardless of where they are located and regardless of whether they are in an area which poses any significant fire risk. That position, however, is not consistent with the scope of this proceeding. This is not a proceeding

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[39] As noted above, the CIP Coalition does not believe that detail inspections are necessary or appropriate for their type of facilities. CIP 1's inclusion of such type of inspection is a good faith effort to address other parties concerns despite the lack of evidence as to their validity.

[40] Phase 2 Workshop Report, at B-75.

[41] Phase 2 Workshop Report, at B-72.

[42] *Id.*

[43] *See* Phase 2 Workshop Report at B-73 (CPSD Opposition). LA County also notes that it rejects CIP 1 because it believes that the 3-year and 9-year cycles are inadequate and that the lack of intrusive inspections is problematic. *See id*. at B-74. However, LA County offered no MAP to address either of

(footnote continued)

designed to address any generalized concern that CPSD (or any other party) may otherwise have with G.O. 95, although the MAPs offered by CPSD and by SDG&E would lead one to believe otherwise.[44] Indeed, Rule 31.2 already imposes a statewide obligation on CIPs and electric utilities to inspect their lines "frequently and thoroughly" regardless of where they are located and regardless of whether they pose any fire risk.[45] As noted above, however, the purpose of this phase is to focus on additional specific safety precautions that will potentially reduce fire risk and to do so in a reasonable and appropriate manner.

Moreover, the scope of the inspection obligation was made clear in Phase 1, which focused on extreme and very high fire threat zones, albeit only in the specific areas defined as the Southern California Counties. CIP 1 expands both the scope (i.e., specified fire areas throughout the State) and the nature (i.e., patrol and detailed) of the inspections, but appropriately maintains the focus on areas which pose some type of cognizable fire threat.[46] As such, CCTA, Comcast, CTIA, NextG, Sprint Nextel, Sunesys, Time Warner, T-Mobile, tw telecom and Verizon believe CIP 1 maintains the direction provided by the Commission in the Phase 1 Decision, represents a reasoned compromise of the parties' positions, and as such represents a suitable inspection rule for CIP facilities.

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those supposed concerns with CIP 1 and thus its comments to that affect must be accorded little weight.

[44] *See* Section VI.B.3, *infra*.

[45] CIPs' existing inspection programs complying with Rule 31.2 have been discussed at length in Phase 1 and in the workshops for Phase 2. *See, e.g.,* The CIP Coalition [Phase 1] Opening Comments on Proposed Rules of the Consumer Protection and Safety Division (filed March 27, 2009) at 9-11, 18-22.

[46] If parties believe those fire threat zones are too narrowly focused, their comments should be directed at the mapping proposal in MAP No. 14, not the inspection proposal. Tellingly, no such criticisms have been offered to date.

3. CPSD and SDG&E MAPs: The Commission Should Reject Both CPSD and SDG&E's Arbitrary Inspection Cycles.

a. Introduction.

CIP Coalition members provide a significant piece of evidence to support their inspection proposals—an extensive report from Exponent, an independent fire expert, to help focus CIP inspection efforts on areas throughout the State most prone to fire threats. In contrast, CPSD and SDG&E provide no evidence to support their MAPs. Instead, they merely proposed MAPs that attempt to impose electric-based inspection types and cycles from G.O. 165 on CIPs. In addition to the inappropriateness of a wholesale importation of rules designed for electric facilities onto communication facilities, it is critical to understand that the regulation at issue—G.O. 165—was ***not*** based on the type of concerns over potential fire safety at issue in this proceeding. In fact, as discussed below, G.O. 165 was formulated based on evidence regarding the deteriorating ***quality*** of major electric equipment, the electric industry's inspection and maintenance practices in connection with such equipment, overall concerns with service reliability, and a regulatory framework found inadequate to handle the pressures of opening the electric industry to competition, all elements inapplicable to this proceeding. Moreover, there has been no evidence introduced in this proceeding that suggests—even for the electric utilities—that the imposition of the G.O. 165 inspection requirements has appreciably reduced the number of fires, including wildland fires, involving electric utility overhead facilities.

b. Examination of the Proceedings That Led to the G.O. 165 Inspection Regime for IOUs Reveals That Electric Inspection Requirements Have No Bearing on CIP Inspections.

In Phase 1, CPSD initially proposed to impose an inspection program on CIPs by incorporating such requirements into G.O. 165. As CPSD explained, its approach was intended to avoid "reinvent[ing] the wheel" when adopting inspection types and cycles for CIPs.[47] According to CPSD, "[c]larifying the applicability of G.O. 165 to CIPs . . . is consistent with existing requirements."[48] CPSD ostensibly abandoned its effort to amend G.O. 165, but its proposed MAP in Phase 2 effectively imposes the inspections regimes and cycles from G.O. 165 on CIPs. SDG&E's MAP does likewise. Throughout the workshops, SDG&E argued CIPs should inspect at the same cycles as IOUs and the rationale for its MAP states unequivocally that "CIPs should have the same detailed inspection interval as electric utilities do."[49]

The problem with CPSD and SDG&E's proposals is, among other things, that the rationale for adopting G.O. 165 and the decisions leading up to the adoption of that General Order was ***not*** fire risk mitigation, but instead was IOU service reliability.[50]

The Commission adopted G.O. 165 for five reasons related to service reliability. *First*, consistent with the goal of ensuring reliable service, D.96-11-021 focused on urban areas because by definition these areas pose "safety and reliability

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47 January 21, 2009 PRCs at 4. *See also id*. Attachment unnumbered page 6.

48 *Id*.

49 Workshop Report at B-98.

50 *See* D.96-12-088, 1996 Cal. PUC LEXIS 1195 (Cal. PUC 1996) (explaining that the Commission "recently pursued several paths in order ***to improve and ensure reliability***, concentrating on maintenance and repair. In 1994, we issued Investigation (I.) 94-06-012 on tree trimming rules for electric utilities, leading to D.96-06-012, which adopted new, interim standards. Our investigation of outages following severe storms in the PG&E service area produced D.95-09-073, which led to two further decisions. The first, D.96-09-045, established standards for overall system reliability, using measures of the duration and frequency of outages. The second, D.96-11-021, proposed enforceable standards for inspection of utility equipment and associated record-keeping. D.96-09-097 revised Commission standards for tree-trimming, designed to insure public safety and system reliability. Finally, R.96-11-004 was issued to consider rules for enforceable standards for safety and reliability.").

consequences to a greater number of people—even though (as is discussed below) the risk of fires in urban areas (as opposed to rural areas) is lower."[51] The Commission thus proposed, and in D.97-03-070 ordered, IOUs to perform patrol inspections every year for urban areas and every two years for rural areas to ensure that major overhead distribution facilities not deteriorate and cause major outages (defined as "outages affecting 10% or more of the customers in the distribution utility's territory").[52]

Second, in January and March 1995, California experienced unusually harsh rainstorms causing several billion dollars worth of damage. PG&E customers experienced over two million electric service outages and average restoration time was deemed by the Commission to be slow.[53] The Commission found that PG&E's slow response was in part due its reducing the frequency of maintenance activities in the prior years and the "questionable condition" of PG&E's overhead equipment, facts based on "an audit PG&E contracted out for to consider its service reliability." PG&E's response to those 1995 storms launched a series of investigations and rulemakings designed "to ensure reliability" leading to D.97-03-070, which adopted G.O. 165.

Third, prior to adoption of G.O. 165, the IOUs had no periodic inspections imposed on them to ensure service reliability. PG&E inspected once every three years, SDG&E every four years (but only opened "facilities for inspections [every] ten year[s]"), and SCE had no specific time frame because it emphasized the need for flexibility

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51 D.96-11-021, 1996 Cal. PUC LEXIS 1145 at *21.

52 *Id.*, 1996 Cal. PUC LEXIS 1145 at *21-22 and D.97-03-070.

53 D.95-09-073, 1995 Cal. PUC LEXIS 744 at Findings of Fact 1 and 2.

offering standards that were "dynamic and subject to change according to industry practices."[54]

Fourth, with competitive pressures in generation but monopoly safeguards in transmission and distribution, the Commission worried IOUs would reduce expenditures on maintenance of transmission and distribution lines and major equipment, reducing network reliability,[55] but still recover losses through regulatory mechanisms such as Catastrophic Event Memorandum Accounts (CEMA) and Electric Revenue Adjustment Mechanisms (ERAM).[56] Unlike competitive industries, an IOU could "underspend its maintenance budget granted in the general rate case, keep the savings as profits,[57] and then recover through the CEMA costs that resulted from underspending the maintenance budget."[58]

Fifth, in assessing standards to impose on IOUs, the Commission relied heavily on a study by Black and Veatch Associates commissioned by PG&E. That study provided summaries of industry practices and engineering standards, reflecting the most stringent practices in the electric industry.[59] The detailed cycles that the Commission finally proposed (and eventually adopted in G.O. 165) were based on Black and Veatch's report that established acceptable electric industry practices related

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54 D.96-11-021, 1996 Cal. PUC LEXIS 1145, *9-*10.

55 D.95-09-073, 1995 Cal. PUC LEXIS 744, *20 ("The current regulatory system has evolved under the general assumption that the utility is operating in a monopoly environment, protected from direct competition and associated financial risks. . . . Some regulatory mechanisms would reward the utility for reducing level of service and compromising safety.").

56 *Id*.

57 Through general rate cases, IOUs "retain the savings they realize from cutting costs." D.95-09-073, 1995 Cal. PUC LEXIS 744 at *21.

58 D.95-09-073, 1995 Cal. PUC LEXIS 744, *22.

59 D.96-11-021, 1996 Cal. PUC LEXIS 1145 at *7.

to deterioration of aging electrical equipment. In considering the findings in that report, the Commission held that "Industry practice suggests that ten years between inspections could cause equipment to deteriorate beyond acceptable levels. For these reasons, we propose that [electric] utilities be required to undertake detailed inspections of *major* distribution overhead facilities every five years."[60]

c. There Is No Basis To Support an Electric Inspection Regime for CIPs.

As discussed above, G.O. 165 was borne out of concerns which are unrelated to this proceeding, and no party has presented any comparable evidence to suggest otherwise. For example, there has been no report comparable to the PG&E-commissioned system reliability audit of itself or the PG&E-commissioned Black & Veatch report. In addition, the life-cycle of communications facilities is not at issue here. Moreover, neither the Commission nor CPSD has expressed any concern in this proceeding with the regulatory frameworks for CIPs. In fact, the opposite holds true because communications companies have operated in competitive markets for many years such that their "profits rise and fall according to customer satisfaction with service"[61] and network reliability. With full appreciation of this background, the Commission should reject CPSD and SDG&E's proposals, because they fail to provide even a semblance of a record comparable to the record that justified imposing G.O. 165 inspection types and cycles on IOUs.

Moreover, the Commission should bear in mind that it has had over a decade of experience with G.O. 165, yet neither CPSD nor SDG&E has offered any analysis of the effect, if any, of the inspection rules adopted in G.O. 165 on the number or severity of

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[60] D.96-11-021, 1996 Cal. PUC LEXIS 1145 at *22-*23.

wildland fires caused or contributed to by overhead electric facilities since adoption of G.O. 165. CPSD and SDG&E appear to presume that the inspection requirements imposed on electric utilities in G.O. 165 have reduced fire risks associated with electric utility facilities, but there is no scientific or technical analysis to support this assumption, and neither CPSD nor SDG&E has provided any valid basis for extending the requirements of G.O. 165 from electric facilities to CIP facilities which, as noted above, have very different characteristics than electric facilities.

d. CPSD and SDG&E's Inspection Proposals are Not Related to the Fire-Prevention Goals of this Proceeding.

CPSD and SDG&E would impose annual patrol inspection obligations on all overhead communication facilities located on joint poles and a designated number of poles away.[62] They would make this obligation mandatory throughout the State in urban and specified fire threat zones in rural areas on the same schedule as those required of electric facilities despite the undisputed difference in risk factors.

i. Patrol Inspections.

CPSD and SDG&E offer proposals for annual statewide patrol inspections in designated high fire areas in Southern California and in *all urban* areas statewide. Those inspections occur no less than once every two years in all other ***rural*** areas of the State. The greater frequency for urban area inspections is inconsistent with the overarching fire-risk mitigating purpose of this proceeding and only confirms how

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[61] D.95-09-073, 1995 Cal. PUC LEXIS 744, *26.

[62] SDG&E's proposal would also require the inspection of CIP-only facilities within "3 pole spans" of joint use poles subject to annual inspections, while CPSD would only expand the inspection obligation to those CIP-only facilities that are one span away from joint use poles.

inappropriate it would be to impose G.O. 165 requirements in this context.[63] It is well-recognized that rural, not urban areas, generally pose a greater risk of fire, and given the wildland fires that have occurred over the last several years in California, this proceeding has undisputedly focused on *wildland fires*—not urban area outages or fires.[64] The CPSD and SDG&E proposals, however, would arbitrarily require more frequent inspections of urban areas.

While the urban-area inspection cycle is inapposite to the genesis and scope of this proceeding, it is not entirely surprising as it stems from CPSD and SDG&E's efforts to impose G.O. 165 IOU outage-preventing reliability-based regulations on CIPs, without any evidentiary record to support such a move. As mentioned above, IOUs have more frequent inspections of urban areas because the density of population in urban areas results in outages affecting more people when equipment fails.[65] The Commission imposed on IOUs less frequent inspections in rural areas, even though it recognized that rural "areas can be subject to severe fires"[66] because rural areas "are less populous."[67] In other words, the concerns addressed by G.O. 165 are completely divergent from the "wildland fire" scope of this proceeding. CPSD and SDG&E's proposals inappropriately would have CIPs perform inspections on the same schedule as the electric utilities despite the fact that IOU inspections seek to ensure reliability,

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63 Phase 2 Scoping Memo at 1; *see also* CPSD June 8, 2010 Motion at 10 ("[t]he Phase 2 Scoping Memo specifically states that 'the *overarching objective* of Phase 2 is to consider measures to reduce the fire hazards associated with utility facilities.") (citing Phase 2 Scoping Memo at 8) (emphasis added).

64 Urban area fires have not been a concern in this proceeding because, by definition, given the asphalt and concrete nature of urban areas they provide less fuel to propagate fires, structure fires generally take longer to become an immediate issue, and fires are discovered and generally extinguished rapidly by nearby fire stations.

65 D.96-11-021, 1996 Cal. PUC LEXIS 1145 at *21.

66 *Id*.

prevent outages and only address aging *major* equipment. Moreover, CPSD and SDG&E's MAPs do not account for the undisputed negligible fire risk factors associated with CIP facilities.

In fact, CPSD and SDG&E have provided neither evidence nor compelling reasoning that it is necessary for CIPs to conduct such inspections on the cycles set forth in their MAPs. The evidence in the Exponent Report and the experience of the past 100 years clearly establish that communications lines attached to joint use poles pose a negligible, if any, risk of fire. SDG&E and CPSD have not provided any contrary evidence nor have they provided any justification for imposing G.O. 165 requirements on CIPs or any evidence that G.O. 165 is an effective model to address fire safety. To impose the same inspection types and cycles on CIPs as that imposed on electric utilities is inconsistent with the scope of this Phase 2.

On the other hand, both of the proposals presented by CIP Coalition members provide for patrol inspections to be focused on joint poles in designated fire areas and to conduct those inspections on a more reasonable, and appropriate, schedule (*e.g.,* three years or five years depending on the proposal) for these type of low-risk facilities, overhead facilities that experience shows do not have the same deterioration qualities of major electric distribution facilities.

ii. Detailed Inspections.

SDG&E and CPSD's proposals for detailed inspections are similarly unsupported and fundamentally flawed. CPSD and SDG&E's desire to impose detailed inspections is clearly based on G.O. 165. Even the use of the term comes straight from that G.O.

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[67] *Id.*, 1996 Cal. PUC LEXIS 1145 at *20-21.

As mentioned above, the Commission mandated that IOUs perform "detailed inspections" based on a desire to forestall outages caused by aging *major* equipment. CPSD's transfer of G.O. 165 detailed inspection concepts to CIPs varies in that the cycle it arbitrarily proposes is 10 years, while SDG&E proposes to impose a five-year inspection cycle. Neither proposal is supported by any evidence or rationale tied to this proceeding.

Instead of discussing the specific major equipment of CIPs that might cause concern or providing support for a particular inspection interval, CPSD's rationale for its MAP relies on the desire to have a uniform understanding of the term "frequent and thorough" found in G.O. 95, Rule 31.2, and change what it believes is the current lack of "any inspection program."[68] The CIPs do not disagree with bringing structure to inspections responsive to this proceeding's overarching goals, and therefore have proposed reasonable inspection cycles in specified fire areas. But CPSD's proposal (and SDG&E's by its adoption of CPSD's rationale) arbitrarily ties its proposed detailed inspection requirement squarely on G.O. 165's back without providing any evidence that the G.O. 165 inspection regime reduces fires or makes sense as to CIPs or whether the benefits of those inspections and cycles outweigh their costs. Indeed, when discussing the benefits of its proposal, CPSD expresses nothing more than speculation as to those benefits: "there will be a reduction in the *possibility* of fires"[69] and omits any discussion of costs.

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[68] Phase 2 Workshop Report at B-87.

[69] *Id.* at B-88 (emphasis added).

Nevertheless, despite the lack of evidence of outage-preventing maintenance concerns that lead to G.O. 165 with regard to CIP facilities as well as the lack of evidence that G.O. 165 has led to the reduction in fires, and the serious misgivings about the need for detailed inspections at all, in the spirit of cooperation and good faith prevailing in the workshops, some members of the CIP Coalition have proposed to perform detailed inspections ***in specified fire risk areas*** once every nine years,[70] which at least properly focuses on this proceeding's fire-risk-mitigation overarching goal.

iii. SDG&E's Three Pole Spans Inspection.

SDG&E's MAP would require annual inspections of CIP facilities within "3 pole spans" of joint use poles as opposed to one span in the CPSD MAP. SDG&E offers no evidence as to the propriety of this additional burden. Furthermore, SDG&E's proposal is difficult to operationalize because it would require a differentiation in CIP facilities (*i.e.*, facilities three span lengths away from joint use poles), and then require CIPs to identify and monitor those facilities in a manner which differs from their other facilities, adding unnecessary complexity and costs.

iv. Costs of Inspections.

The Commission must take great care not to impose arbitrary obligations resulting in unnecessary costs that ultimately harm consumers. The costs that CPSD and SDG&E's proposals would arbitrarily impose here are not small. Just the costs of one carrier are astounding. Based on a preliminary cost-feasibility, AT&T, for example, has estimated the costs for CPSD's proposal to be over $18 million per year for its company and for SDG&E's proposal to be well over $20 million. These estimates are

[70] The nine year interval is also easier to operationalize because it is a multiple of the 3 year *(footnote continued)*

incremental to AT&T's existing operational costs to maintain its aerial infrastructure and exclusive of system development costs, required equipment and tools to perform inspections and associated administrative costs.

For the foregoing reasons, the Commission should reject CPSD and SDG&E's MAPs, as they impose unsupported and arbitrary inspection types and cycles divorced from the fire-risk mitigating goals of this proceeding. Instead, the Commission should adopt one of the CIP Coalition's inspection MAPs, which given the negligible risk of fires their facilities pose, provide for inspections on reasonable frequencies in specified fire areas throughout the State.

4. The Commission Should Reject CPSD's Proposal That Would Require Intrusive Inspections Of CIP-Only Poles.

CPSD's Rule 80.1 MAP would require intrusive inspection of certain wood poles supporting only communication lines/equipment based on a complicated and arbitrary scheme that mandates inspection depending on the geographic zone where the pole is located and the proximity of the pole to joint use poles. For communications poles located in extreme or very high fire threat zones, intrusive testing would have to be done on all such polls *inter-set between joint use poles* supporting supply lines, or such poles *located up to three spans from a joint use pole*. For communications poles not located in such zones, intrusive testing must be done for such poles that are *one span from a joint use pole* supporting supply lines. CPSD requests that the same time cycles for intrusive testing that apply to joint use poles be applied to communications poles.

The CIP Coalition opposes adoption of the intrusive testing rule introduced by CPSD because it is without evidentiary support, not focused on addressing fire hazards

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inspection cycle.

associated with electric and CIP lines attached to joint poles, not limited to extreme and very high fire zones in California, and imposes costs upon CIPs without creating any demonstrated reduction of fire hazards. Furthermore, CPSD's proposed intrusive testing time cycle is inappropriate insofar as it adopts the exact same cycle for CIP poles as that used for poles with electric facilities attached to them, despite the demonstrably lower fire risk, if any, posed by communications-only poles.

The Commission has made abundantly clear that this proceeding should focus upon mitigating fire hazards associated with electric facilities and CIP facilities on joint use poles. *CPSD's Rule 80.1 MAP goes beyond this defined scope by imposing requirements on poles that are owned by CIPs and that have only CIP facilities on them*. There are no electric lines attached to these poles and, thus, the fire hazard associated with electric facilities does not exist. There is simply no logic behind applying the intrusive testing rules that apply to joint use poles to communications-only poles. For this reason alone, CPSD's MAP should be rejected.

CPSD's MAP is also beyond the scope of this proceeding because it is not limited to areas of high fire risk. As discussed by the CIPs with respect to the inspection rules above, any rule adopted in this proceeding should be limited to areas of high fire risk in the State. There has been no evidence whatsoever in this proceeding, however, that the intrusive testing of poles with only CIP facilities attached will in any way contribute to a reduction in fires. No evidence has been introduced that these types of facilities have in fact caused any fires, much less large scale wildland fires that have been the focus of this proceeding. Moreover, there has been no showing that intrusive testing would yield information resulting in the prevention of fires. Finally, under any

scenario, the use of the same time cycles set forth in G.O. 165 for intrusive inspection of poles with electric facilities is not merited given that the vast difference in fire risks associated with those facilities.

Because there is no benefit vis-à-vis fire prevention to be obtained from CPSD's Rule 80.1 MAP, any costs associated with such intrusive inspections would be unreasonable in the context of a proceeding aimed at reduction of fire hazards. Furthermore, the costs of intrusive testing as required by CPSD's Rule 80.1 MAP are not trivial. In the case of AT&T alone, the estimated costs for the first round of intrusively testing all of its solely-owned poles with only CIP facilities on them would be approximately $11 million.[71] These costs are in addition to the other inspection costs described above with respect to patrol inspections. Given that there would be no reduction to fire hazards associated with CPSD's MAP, these costs should not be imposed on the CIPs or their consumers. Furthermore, pursuant to the criteria in the Phase 2 Scoping Memo (at 11), CPSD has not met its burden to demonstrate how its Rule 80.1 MAP reduces fire hazards and to demonstrate the benefits of the PRC outweigh the costs.

Finally, the procedural history of CPSD's Rule 80.1 MAP itself demonstrates that there is no basis for adoption of the rule, and that it is outside the scope of this proceeding. The Phase 2 Scoping Memo as modified by the Assigned Administrative Law Judge's Ruling dated November 23, 2009 required PRCs to be submitted on December 16, 2009. On that date, PG&E was the only party to submit a PRC related to

[71] AT&T has included intrusive testing costs for all its solely-owned poles with only CIP facilities in this cost estimate because it does not have data that identifies how many of these poles are inter-set between joint use poles, three spans from a joint use pole, or one span for a joint use pole as specified in CPSD's Rule 80.1 MAP.

intrusive testing. PG&E's PRC as submitted required intrusive testing by all pole owners and was not focused on poles with only communications lines. CPSD itself did not introduce any rule related to intrusive testing, thereby indicating it did not believe such a rule was needed.

Subsequently, PG&E's PRC regarding intrusive testing was discussed at workshops held on March 24, 2010 and again on May 26 and 27. Based on the responses to address PG&E's concerns regarding intrusive testing, PG&E decided to withdraw its PRC. Although PG&E withdrew its PRC, CPSD decided on the very last day of the regularly scheduled workshops to distribute its own intrusive testing alternative. CPSD's MAP was introduced on May 27 and further revised and distributed again on June 10—after the ALJ extended the workshop schedule on the CIPs' request for additional time to address mapping issues—as a new "Rule 80.1B" MAP. If CPSD believed that such a rule was required, it should have offered it in December 2009 or, at least, well before the final two workshop days. In either event, there was no evidence introduced at the workshops either before or after CPSD introduced its PRC that even suggests, not to mention established, that CIP poles with only CIP facilities pose a fire risk. For all the reasons discussed above, CPSD's proposed rule should be rejected.

C. MAP No. 14—Fire Mapping: The Commission Should Adopt the Maps Developed by the CIP Coalition for use in CIP Inspections.[72]

In Phase I of this proceeding, the Commission required CIPs to inspect facilities in the Extreme and Very High Fire Threat Zones in the seven counties in Southern California (as denoted on Cal Fire FRAP Threat Maps). In adopting the FRAP Map for

[72] Cox has abstained from taking a position on this MAP and, as a result, does not join in this section of the CIP Coalition brief.

use in identifying, among other things, the designated CIP inspection areas in Southern California, the Commission acknowledged the map's limitations[73] and made clear that the use of this map to establish "Extreme and Very High Fire Threat Zones" in Southern California *does not necessarily mean we will use the map to establish these zones in Northern California*."[74] Consistent with the overarching objective of the Rulemaking and building on the Phase 1 Decision, the Phase 2 Scoping Memo stated that "Phase 2 may consider if the Fire Threat Maps should be used to establish the geographic scope of the *CIP inspection rule in Central and Northern California.*"[75] More specifically, the Scoping Memo sought to examine in this Phase 2 "whether the fire hazards *in Central and Northern California* are different from Southern California, and if so, whether different maps or other tools should be used to determine the geographic scope of any CIP inspection rule that may be adopted for *Central and Northern California,*" and (ii) "whether a better, utility-specific map can be developed."[76] In short, the Commission made clear that it would not revisit in Phase 2 the determinations made in Phase 1 to use the FRAP maps in Southern California. Rather, the emphasis shifted to the appropriate maps to use for Northern and Central California.

Consistent with the direction provided in the Scoping Memo, and in order to better assess the fire hazard areas in Northern/Central California, the CIP Coalition retained fire experts from Reax Engineering, Inc. and the University of California at

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73 *See* Opening Comments of Cal Fire on Proposed Rules, R.08-11-005 (March 23, 2009) at 2 (noting that the FRAP MAP does not emphasize the spatially dependent consideration important to fire propagation such as the continuity of wild land fuels nor *does it address the nature and frequency of high wind events* that are likely influential in causing electrical facility ignition).

74 Decision 09-08-029, at 23.

75 Phase 2 Scoping Memo, at 5 (emphasis added).

76 *Id*., at 6.

Berkeley who developed a fire threat map for Northern and Central California (the "Reax Map").[77] The Reax Map specifically characterizes the fire threat in Northern and Central California by taking into account, among other things, high resolution, statewide variation in wind conditions—conditions which are widely recognized as critical in assessing fire risk and which are otherwise not accounted for in the FRAP Maps. The methodology employed by Reax, while based on the FRAP Map framework, applied several enhancements including high resolution numerical weather prediction,[78] which was then used to assess the impact of elements leading to fire initiation associated with joint-use utility poles such as wind induced pole/line failure, ignition source and fire spread behavior. The end result was the creation of a fire threat map which takes into account more extensive and more recent data than the FRAP Maps and more accurately specifies the geographic areas in Northern and Central California that entail relatively higher fire threats.[79] Having created a map which more accurately tracks the fire hazards in Northern and Central California, the CIP Coalition has—consistent with the specific directives of the Phase 2 Scoping Memo—proposed its use in the context of CIP inspections of their facilities in those areas of the State. The Commission should therefore adopt the Reax Map for use in focusing CIP inspections in fire threat zones identified in that map.

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[77] The resumes of the principal creators of the map and associated study are appended to this brief.

[78] Numerical weather prediction includes capture the offshore (Foehn) wind days for the period of 2004 through 2008 at a resolution of 1.9 km which provides detailed spatial fields of wind speed, direction, temperature, and relative humidity.

[79] In discussing improved mapping, Cal Fire has stated that a couple of items were imperative, specifically, "updated or expanded data on vegetation and localized wind data and other weather data but particularly extreme winds is critical to dealing with mapping that is responsive to the kinds of things that impact utility[ies]." *See* Transcript R.08-11-005 (May, 25, 2010) at 24, lines 10-16 (Cal Fire-Cromwell).

Unlike the CIPs, no other party attempted to assist the Commission by producing a map for Northern and Central California inspections. Moreover, having failed to offer an alternative fire map in the workshop process, certain of the parties now ask the Commission to effectively disregard the efforts of the CIPs to follow the Commission's directives and the work of expert consultants that created the map. Instead, they propose that the Commission create yet another map in some future phase of the process. More specifically, CPSD/MGRA request that the Commission adopt an ordering paragraph, directing "participating parties, investor-owned electric utilities (IOUs) and communication infrastructure providers (CIPs) [to] meet and confer with CAL FIRE and CPSD staff in order to discuss how to create utility-specific high-resolution maps combining wind and vegetation data that identify areas at the greatest risk of catastrophic power line wildland fire ignitions,"[80] which would be used "for determining inspection and maintenance cycles in all cases where geographic locations and maps are referred to in General Orders 95 and 165."[81]

Adoption of CPSD/MGRA's proposed ordering paragraph makes no sense. A high resolution map identifying the areas of potentially greatest risk for fires in Northern and Central California has already been created, *i.e.,* the Reax Map. Moreover, in the context of the Commission's General Orders, CIP inspections constitute the only circumstance for which maps of Northern and Central California are relevant. In other words, at this time, there are no other rules or proposed rules which rely or would rely

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80 Phase 2 Workshop Report, at B-211.

81 *Id.*

on high resolution fire maps in Northern and Central California. As stated by Sierra Pacific:

> [I]it is unclear how any maps developed under [the CPSD/MGRA] proposed rule change would be used to interpret or enforce G.O. 95 requirements, if at all. The CPUC should not require the IOUs and CIPs to fund a mapping effort that may ultimately have no bearing on the requirements applicable to IOUs or CIPs.[82]

Indeed, CPSD and MGRA have proposed the expenditures of significant funds to create a map for which there is no context, save one—CIP inspections. And a map with that purpose in mind has already been developed and entered into the record.

Moreover, CPSD and MGRA have provided no substantive objections to the use of the Reax Map. There opposition boils down to two points, neither of which holds up to even minimal scrutiny. Their first objection is that the Reax Map and associated report has yet to undergo peer review. Thus, MGRA states "[l]ikewise, while we believe that *the Reax map is likely better and more appropriate than the existing CAL FIRE threat maps*, we do not believe that it should be adopted on a permanent basis until and unless a formal review is complete."[83] Similarly, CPSD asserts that "without the appropriate peer review, CPSD cannot advocate using this map for Northern and Central California."[84] That the Reax Map and report has yet to complete the peer review process is not a basis for the Commission to reject it or relegate it to an interim measure.

First, it should be noted that when adopting the FRAP Maps in Phase 1, no evidence was ever submitted that these maps had undergone a formal peer review, nor

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82 Workshop Report at B-221.

83 *Id.,* at B-233 (emphasis added); *see also*, at B-213.

84 *Id.*, at B-232.

was any associated report attached to the FRAP Maps to explain to the Commission the methodology used in their creation. Indeed, the FRAP Map was adopted over direct evidence showing that the maps ***were not*** prepared for the regulatory purposes at issue here.[85]

In contrast, the Reax Map is derived from a methodology designed with the intended use of the ultimate product in mind—maps to be used to denote the areas of relative highest fire threat for the purpose of the inspection of CIP facilities. This methodology is clearly articulated in the associated report.[86] This methodology explicitly takes into account and attempts to correct for the known deficiencies in the FRAP Map. These deficiencies include the facts that the (1) FRAP Map's fire rotation component (a proxy for ignition/burn probability) is based on historical fire perimeters which includes fires initiated by *all* causes, and is in no way correlated to the likelihood that a CIP facility collocated with electrical facilities could ignite a fire; (2) the FRAP Map does not specifically address local (or even regional) wind pattern; and (3) the FRAP Map does not specifically address spatial variations in wind and weather patterns and therefore does not capture local or regional variations in potential fire behavior.[87]

Second, as was made clear by the experts, who created the Reax Maps and came to the workshops to answer questions regarding the Reax Maps from all participants, including CPSD and MGRA, it is standard practice in their field to submit studies, such as the one undertaken by Reax, to peer review *for publication in academic journals*. Indeed, the Reax Map and associated report will be subject to such peer

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85 *See*, Opening Comments of Cal Fire on Proposed Rules, R. 08-11-005 (March 27, 2009).

86 Reax Report, Appendix E to Phase 2 Workshop Report.

87 Reax Report, Appendix E to Phase 2 Workshop Report, at 8.

review. However, the Commission does not require peer review with respect to expert reports submitted to the Commission. In fact, the Commission regularly reviews expert reports and testimony that have not undergone peer review and issues decisions addressing the merits of such reports. As it did in Phase 1, the Commission should review the map at issue and come to a conclusion regarding the use of a map for inspections. Given that the Reax Map is, without a doubt, the most sophisticated, up-to-date fire map yet created for these purposes, the conclusion the Commission should reach is clear: the Commission should approve the use of the Reax Map for the CIP inspection rule (Rule 31.2) and reject CPSD/MGRA's proposed ordering paragraph. It simply makes no sense, and is contrary to the clear directions of the Scoping Memo, to start the process over "from scratch."[88]

The second basis for CPSD's and MGRA's opposition to the Reax Map is that it excludes the seven Southern California counties for which the Commission adopted the use of the FRAP Map for CIP inspection purposes in Phase 1.[89] As an initial matter, the fact that a Reax-type map has not been produced for Southern California is simply not a basis for rejection of the Reax Map for Northern and Central California.[90] This is

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[88] Indeed, at a minimum MGRA appears to be confused about exactly what the effect of the ordering paragraph which they are cosponsoring with CPSD would have. Thus MGRA states with respect to the ordering paragraph: "It is for this purpose that we joined with CPSD in *requesting an Ordering Paragraph that would initiate the creation of a formal review process* in which CAL FIRE would play a role in the approval of any fire hazard map to be used by the utilities for public safety purposes." Workshop Report, Appendix B, at B- 233. The ordering paragraph does not just initiate the creation of a formal review process, but rather initiates the creation of a new high resolution map, of which peer review would just be one aspect.

[89] Phase 2 Workshop Report, at B- 213.

[90] CPSD has overstated the availability of a map for southern California using the Reax methodology. Thus, CPSD states that "It should be pointed out that the maps created by the Reax consultants for the CIP Coalition are purportedly also available for Southern California if there is demand for them. Should these maps be vetted and approved, it is possible that maps in a ready or near-ready state already exist and would require no further production cost." *See* Workshop Report, Appendix B, at B-216. What Reax represented is that the same type of analysis could be used to extend the maps to

(footnote continued)

especially true since, as discussed above, the CIP Coalition, in requisitioning the work from Reax, was following the directives of the Phase 1 order and the Phase 2 Scoping Memo, *i.e.,* determining whether there was a better tool than the FRAP Map for establishing the geographic scope of the *CIP inspection rule in Central and Northern California.* Moreover, the creation of a new map for Southern California should be rejected because of the burdens it would place on the CIPs. Pursuant to the Phase 1 Order, the FRAP Maps have already been utilized to operationalize the required inspections of the seven Southern California counties.

The CIP Coalition has presented in the record of this proceeding a fire threat map prepared by known experts in the field for use in CIP inspections. CPSD/MGRA have proposed that the Commission order parties to "start from scratch" and create a map for yet unspecified reasons, which when all is said and done would likely be materially comparable to the Reax Map. The Commission should reject the ordering paragraph proposed by CPSD/MGRA and adopt the Reax Map for CIP Inspection purposes.

D. MAP No. 10—General Order 95, Rule 44 .1: The Commission Should Adopt The CIP Coalition's Cooperation Proposal Which Establishes Clear Expectations For The Timely Exchange Of Information. [91]

Cooperation by, between and among the electric utilities and the CIPs is necessary to ensure that joint poles are designed, constructed and modified in compliance with the appropriate pole loading/safety factors of Rule 44. Among other things, such cooperation mitigates the chance of pole failures and any associated fire

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southern California. Such analysis has not been done yet, and additional costs would be incurred to complete the analysis.

[91] Sunesys does not join in the CIP Coalition support of its MAP for Rule 44.1 or the CIP Coalition's opposition to the IOUs' proposed adoption of Appendix 1 MAP.

risks. While the CIPs and electric utilities generally do cooperate, they have had disputes on occasion, frustrating timely calculations and pole attachments. Specific cooperation rules in this context will assist in assuring all entities have sufficient information to timely evaluate the safety implications of potential additions to poles as well as the timely replacement of poles where appropriate.

As indicated in the Workshop Report, workshop participants came to agreement on basic principles of cooperation as to pole loading calculations. Thus, the text of the CIP Coalition's Rule 44.4 MAP and the IOUs Rule 44.4/Appendix I MAP are essentially identical.[92] At their core, they both provide as follows:

- all entities on a joint pole will cooperate with entities seeking to perform pole loading calculations;
- parties should have flexibility on how to exchange readily available information;
- parties rejecting pole attachment/joint pole applications must timely communicate why; and,
- response times should be flexible enough to deal with exigent circumstances.

The only substantive difference between the two MAPs is that the CIP proposal would place these requirements in a G.O. 95 rule, while the IOU proposal would relegate them to a G.O. 95 Appendix. That difference, however, is significant.

Placing the provisions in a rule serves as clear notice of expectations in terms of this limited cooperation provision. In contrast, the implications of placing these "requirements" in an appendix, as the IOUs suggest, are at best ambiguous. For

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[92] The only differences in the text of the MAPs are (a) the CIP MAP allows cooperating entities to "provide" requested information or make it "reasonably available" while the IOU MAP does not include any language about making information reasonably available, and (b) the CIP MAP requires parties to provide information on how pole loading calculations were exceeded "with the returned application" while

(footnote continued)

example, it is unclear if all covered entities would be obligated to comply with the terms of the appendix and what, if anything, they could do if another party did not cooperate. At worst, the terms of the appendix could be interpreted as nothing more than "recommendations" which entities could disregard if they so chose. This can lead to exactly the type of disputes that the CIP proposal seeks to avoid.

In addition, the Commission's enforcement role for provisions in an appendix is equally unclear. An entity unduly frustrated in its efforts to perform timely and necessary pole-loading calculations would be further stymied by having to first establish CPSD's role in any potential dispute and CPSD's interpretation of whether it can or will enforce an appendix devoted to recommendations before reaching the merits of the dispute. The CIPs do not see any justification for creating such ambiguity or awkward procedural process.

Moreover, the CIP MAP does not, as the IOUs contend, "force"[93] cooperation or otherwise create a set of overly prescriptive requirements, nor does it limit the various other ways entities may choose to cooperate, just as they have in the past. Instead, it provides basic requirements, while allowing appropriate flexibility on the type of information to be shared as well as the timeframe in which to do so. Absent those requirements, parties may get locked in unnecessary disputes—as they have in the past—over the timely sharing of information.

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the IOU MAP does not make any reference to when such information should be provided.

93 *See* Workshop Report, IOU Statement in Opposition at B-163 ("the JEUs wholly disagree with the notion that a new General Order (GO) 95 is needed to force 'cooperation'…); *see also* Sierra Pacific Opposition at B-163 ("Sierra Pacific opposes this proposal because it formalizes cooperation requirements within G.O. 95, effectively *dictating the only method* in which cooperation may take place.") (emphasis added).

Finally, as noted above, cooperation among the electric utilities and the CIPs promotes mitigation of the risk of pole failure and any associated fire risks. The provisions of the CIP MAP have been carefully crafted to take into account all of the stakeholders interests (as evidenced by the nearly identical nature of the IOU appendix). There is no apparent reason for the Commission to reject such requirements in the form of a rule clearly understood by all parties.[94]

E. MAP No. 1— General Order 95, Rule 11: The Commission Should Reject the PRC Offered by CPSD and Accept the Alternative Proposed by the CIP Coalition.

The proposed changes to Rule 11 of General Order 95 offered by CPSD and those offered by the CIP Coalition are the same in all respects, save one. While CPSD has proposed to delete the modifier "electrical" prior to the word "line" such that the purpose statement of Rule 11 would be to formulate requirements for "overhead line design, construction, and maintenance" rather than "overhead *electrical* line design construction and maintenance," the CIP Coalition's proposal would retain the original language of the Rule, *i.e.*, maintain the word "electrical" as a modifier of "line."

CPSD's initial proposed changes to the purpose statement of G.O. 95 contained in current Rule 11 were designed to make clear that the general order does not apply solely to the "construction" of overhead electrical lines, but also to the "design" and "maintenance" of those lines.[95] As initially proposed by CPSD in its December 2009 filing, the CIP Coalition had no objection to these amendments. The CIP Coalition could agree with CPSD's rationale for that clarification—that facilities had to be designed and

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[94] Regardless of which MAP the Commission ultimately adopts, the CIPs note that they support the deletion of the cooperation language in Rule 44.2 as that language is, at best, superfluous.

[95] The Consumer Protection and Safety Division's Proposed Rules for Phase 2, R.08-11-005

(footnote continued)

maintained, as well as constructed, in conformance with G.O. 95 to enhance the safety of the facilities. It was the additional modification to the CPSD proposal—removal of the modifier "electrical" prior to "line," offered by CPSD as part of the workshop process, which renders CPSD's proposal unacceptable.

G.O. 95 contains provisions that are applicable to communications facilities and the CIPs' MAP should not be interpreted as an effort to avoid these provisions. But CPSD could not provide a sufficient justification for removing the word "electrical" before the word "line" or guarantee that doing so would not have unintended consequences. While CPSD maintains that "[r]emoving the term 'electrical' should eliminate any confusion over what types of lines the General Order applies to,"[96] no such confusion exists and CPSD has failed to point to any evidence of confusion. Indeed, CPSD's half-hearted support for its own proposal and its support for the CIP Coalition MAP speaks volumes.[97] Moreover, the removal of the modifier "electrical" in no manner advances the overarching objective of this proceeding—to consider measures to reduce the fire hazards associated with utility facilities. CPSD does not even make an argument that it does.

There is a very basic reason why the Commission should not remove the term "electrical" from Rule 11—it is unclear how such deletion would impact the other 400+ pages of the General Order. Rule 11 has not been modified since its initial adoption in 1941.[98] Arbitrarily removing the word "electrical" as a modifier to the word "line," without

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(December 16, 2009) at 9.

96 Phase 2 Workshop Report at B-3.

97 *Id.*, at B-12 ("This PRC is similar to CPSD's proposed rule change to Rule 11, except it retains the word 'electrical.' *CPSD supports either proposal*." (emphasis added)).

98 *See* General Order 95, Contents, at V – VIII (Change List).

going through the entirety of the General Order and making any other necessary conforming changes, inserts major uncertainty into the rule.

Because CPSD has provided insufficient justification for deletion of the modifier "electrical" in Rule 11, and failed to sufficiently relate the change to the reduction of fire or safety risk, and creates unforeseen impacts to other parts of the General Order with its change, the Commission should reject CPSD's proposed modification to Rule 11 and adopt the one offered by the CIP Coalition.

F. MAP No. 5—General Order 95, Rule 31.1: The Commission Should Adopt the Joint Electric Utilities PRC to Clarify G.O. 95, Rule 31.1.

The IOUs propose revisions to G.O. 95, Rule 31.1 to more clearly state what is required in order for electric utilities and CIPs to comply with the general requirements set forth in G.O. 95 and to clarify what constitutes "accepted good practice," as this term is used in the existing Rule 31.1.

G.O. 95 contains a number of general rules and requirements regarding overhead electric and CIP facility design, construction and maintenance for the express purpose of formulating "uniform requirements . . . [that] will ensure adequate service and secure safety."[99] These general rules provide little or no guidance on how to design, construct and maintain such facilities to meet the Commission's expectations and requirements. The IOUs correctly argue that as a result, such requirements are "not capable of being operationalized."[100]

The IOUs' MAP addresses this deficiency by clarifying that an electric utility or CIP that designs, constructs and maintains its facilities in accordance with the

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[99] Phase 2 Workshop Report at B-59, citing G.O. 95, Rules 11 and 31.1.

[100] Phase 2 Workshop Report at B-59-to B-60, and *see also* B-61.

particulars of G.O. 95 is in compliance with the General Order. It would revise Rule 31.1 to explicitly state: "For all particulars specified in this Order, a supply or communications company is in compliance with this rule if it designs, constructs and maintains a facility in accordance with such particulars."

Rule 31.1 also currently provides that where G.O. 95 contains no particular or specific requirements, an electric utility or CIP must design, construct and maintain its facilities in accordance with "accepted good practice," but does not define this standard. The IOUs' proposed MAP seeks to remedy this deficiency by adding a note providing that this standard shall be interpreted on a "case-by-case basis" taking into account "the practices, methods, and acts engaged in or approved by a significant portion of the relevant industry, or which may be expected to accomplish the desired result with regard to safety and reliability at a reasonable cost."[101]

Workshop participants broadly supported this MAP. Indeed, every party that cast a substantive vote, except CPSD, supported the MAP. The CIP Coalition agrees with and supports this MAP and the rationale for the MAP the IOUs provide in the Phase 2 Workshop Report. It would clarify existing rules and requirements in important and constructive respects and would more clearly articulate the standards with which electric utilities and CIPs must comply in order to ensure that their facilities are designed, constructed and maintained as intended by the Commission. It would also help ensure that they follow industry-standard best practices for engineering which are necessary to ensure reliability and safety, including fire safety.

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[101] Phase 2 Workshop Report at B-60.

The MAP would not eliminate existing discretion available to CPSD and the Commission to interpret existing rules and requirements in light of the specific facts and circumstances pertaining to local conditions in the field. Instead, the MAP would help provide all parties with a more common understanding of the performance standards that the Commission expects and requires. This in turn will help utilities and CIPs operationalize the specific rules and requirements stated with particularity in G.O. 95 and in the absence of such particulars to design, construct, and maintain their facilities in accordance with "accepted good practice" as defined under the MAP.

CPSD initially voted in support of the MAP during the workshops, but later changed its vote on grounds that it "does not want to limit its ability to cite electric utilities for unsafe practices."[102] As a result, CPSD now opposes this MAP because it allegedly would reduce its discretion to cite electric utilities and CIPs for allegedly unsafe conditions not covered by other specific G.O. 95 rules.[103] In support of this claim, CPSD alleges that the MAP would permit utilities and CIPs to "collude" to circumvent G.O. 95 related safety practices and "self establish" what constitutes accepted good practice, thereby effectively setting whatever standards for compliance they see fit.[104]

CPSD is mistaken and fails to understand the intent, purpose, and effect of the MAP. The MAP would not alter the existing authority of the Commission to determine what constitutes "accepted good practice." Rather, the MAP would clarify that this standard shall be determined ***by the Commission*** on a case-by-case basis, "aided" by

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102 Phase 2 Workshop Notes for May 5, 2010 Workshop, at 1.

103 See Phase 2 Workshop Report at B-64.

104 Phase 2 Workshop Report at B-64.

reference to the practices and methods of the industry.[105] Thus, the practices of industry participants would not establish the standard for compliance, but would serve as a necessary, practical, and useful guidepost for all parties.

CPSD also fails to acknowledge that the existing provisions of Rule 31.1 are entirely devoid of any substantive information or guidance for CPSD staff or electric utility or CIP engineers, contractors, inspectors and maintenance personnel to use to try and ensure their facilities are designed, constructed and maintained in conformance with the expectations and requirements of the Commission. As a result, it is extremely difficult for electric utilities or CIPs to operationalize the requirements of the existing rule. The IOUs' proposed MAP would address this important deficiency by clarifying the expectations of the Commission as expressed in Rule 31.1. In addition, the MAP would help clarify what is required in order for electric utilities and CIPs to comply with the standards of performance intended by the Commission, and should therefore be adopted.

G. MAP No. 9—General Order 95, Rule 38, Footnote (aaa): The Commission Should Reject the Joint Electric Utilities MAP.

The IOUs propose adding to General Order 95, Rule 38 the following new footnote to Table 2:

> (aaa) The vertical separation requirement between conductors in the adjoining mid-span may or may not require increased vertical separation at the pole based on the sag characteristics of the conductors.

The new footnote would apply to the minimum required clearances between certain wires, cables and conductors not supported on the same poles set forth in Table

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[105] Phase 2 Workshop Report at B-55 to B-56. CPSD's apparent fears that electric utilities and CIPs could "collude" in the establishment of any standard are unfounded and completely inappropriate. There is simply no foundation for CPSD's cynical assumption and it is completely antithetical to the agreement

(footnote continued)

2, Cases 1 through 7,[106] and to the vertical separation between certain conductors and cables on the same pole and in adjoining midspans set forth in Cases 8 through 13. It would not apply, however, to any of the other minimum conductor clearance requirements set forth in Cases 14 through 20. In support of the MAP, the IOUs state that, although advisory in nature, the new footnote is allegedly necessary "to remind responsible personnel that conductor sag is a function of temperature and loading"[107] and that "[w]ith supply conductors often operating at increased thermal loads and with the introduction of new high temperature conductors, it has become even more important for entities with facilities affixed to the same support structure and/or crossing under supply lines to account for the sag characteristics of every line."[108]

This MAP garnered little support during the workshops. Every CIP party present opposed it, and most other non-IOU parties voted neutral. CPSD stated that it considered the MAP unnecessary and flawed,[109] which is a precisely correct assessment. This MAP is poorly thought out, unnecessary, unclear, and would clarify nothing, and would also be difficult or impossible to operationalize.

No one disputes that temperature and electrical loading can affect the sag of electric conductors and the clearances between electric conductors and other wires, cables and conductors. G.O. 95 already contains numerous existing requirements, however, that address conductor clearances and sags. Many of these requirements are

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that the Phase 2 workshops would proceed in "good-faith on behalf of all participants."

106 Unless otherwise noted, all references to "Cases" herein refer to General Order 95, Table 2 cases.

107 Phase 2 Workshop Report at B-151.

108 *Id*.

109 OIR Phase 2 Workshop Notes, for Workshop of May 6, 2010.

quite detailed and prescriptive and were adopted in full recognition of the fact that temperature and operating characteristics can affect sags and clearances.

In addition to the minimum vertical, horizontal and radial clearance requirements set forth in Cases 1 through 20, numerous other rules and appendices set forth specific requirements regarding the effect of temperature, wind, ice, and different conductor types, materials, sizes, and span lengths on conductor clearances and sags:

- Table 2 sets forth the basic minimum vertical, horizontal and radial clearances between conductors and states that these clearances shall be determined at 60°F and no wind.
- Rule 38 further states that the clearances set forth in Table 2 may be reduced due to different temperature and loading conditions, but not more than 10 percent due to such conditions.
- Rule 43 sets forth a number of additional temperature and loading conditions that must be considered in determining conductor clearances, including certain conditions pertaining to conductor sags.
- For facilities installed in areas above 3,000 feet in elevation, Rule 43.1 requires that the facilities be designed for wind pressure of 6 pounds per square foot on conductors and ½ inch of ice.
- For facilities installed in areas below 3,000 feet, Rule 43.2 requires that the facilities be designed for wind pressure of 8 pounds per square foot on conductors and no ice.
- Both Rule 43.1 and Rule 43.2 also require that conductor sags be considered at the "normal temperature for computing erection conditions" of 60ºF and at a "maximum temperature" condition of 130ºF.
- Additional sag requirements are set forth in G.O. 95, Rule 49.4 C (5), Rule 84.5, and Appendix C. Appendix C contains sag curves and formulas for determining the minimum sag necessary to comply with applicable requirements for different conductor types and span lengths at different temperatures.[110] These curves and formulas are based upon the "initial sag" of conductors that are not prestressed.[111]

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110 *See* G.O. 95, Appendix C, Chart 7 and Table 25, for example.

111 *Id.*, Appendix C at C-1.

- G.O. 95, Appendix F also contains examples illustrating “typical problems” encountered in line construction and explains how the conductor sags and tensions should be determined under hypothetical conditions in order to comply with the specific requirements set forth elsewhere in G.O. 95.[112]

- In addition to these specific requirements, Rule 31.1 also states that for all particulars not specified in these rules, “design, construction and maintenance should be done in accordance with accepted good practice for the given local conditions known at the time.”

- Finally, Appendix C specifically states that the sag values contained in Appendix C, Table 25 are greater than required to meet minimum requirements, but are “considered to be in accordance with good practice.”[113]

The IOUs have failed to provide any evidence that the Commission’s existing conductor clearance and sag requirements are not sufficient to ensure a reasonable margin of fire safety so long as they are interpreted and implemented in a reasonable manner consistent with “accepted good practice” within the meaning of Rule 31.1. The CIP Coalition, in contrast, presented evidence that the Commission’s existing vertical conductor clearance requirements are reasonably conservative and in certain respects exceed minimum conductor clearance requirements contained in the National Electric Safety Code ("NESC") applicable in nearly every other state.[114] The IOUs presented no evidence to the contrary.

Even if the IOUs had demonstrated a deficiency in the existing Commission sag and clearance requirements material to fire risks, which they have not, the remedy they propose is fundamentally flawed and provides no means of advancing the Commission’s goal of reducing fire risks.

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112 *See* G.O. 95, Appendix F, Part I at F-1 through F-18.

113 G.O. 95, Appendix C, Table 25.

114 *See* Don Hooper, “PRC No: JEF-7, G.O. 95, Rule 38, Table 2, Footnote (aaa)” presented on behalf of CIP Coalition at workshop of May 5, 2010.

First, the MAP fails to explain what effect, if any, the proposed new footnote would have on existing clearance and sag requirements. If it is intended to have an effect, that effect should be clearly stated, in unambiguous terms. The MAP and the IOU rationale for the MAP fail to do so. It is unclear, for example, whether the sag values contained in Appendix C, Table 25 would still be greater than required to meet minimum requirements of G.O. 95 and consistent with accepted good practice if the MAP were adopted or not. If the existing sag and conductor clearance requirements would be affected by adoption of the proposed new footnote in any respect, the effect on G.O. 95, Appendix C and other existing rules and requirements pertaining to sags and clearances, should be made clear. The rationale for the IOU MAP fails to do so.

Second, the MAP contains no specific requirements and gives no specific direction to utilities or CIPs on how to comply with the new footnote. The proposed new footnote merely states that the sag characteristics of conductors "***may or may not*** *require increased vertical separation* at the pole." This provides no useful guidance whatsoever and can only lead to further complications and disputes in the future.

Third, the MAP is incapable of being operationalized in any meaningful or constructive way. The proposed new footnote provides no substantive information regarding what specific sag characteristics may require increased separation, what type or types of conductors may require additional separation, under what conditions additional separation may be required, or how much additional vertical separation may be required. In their attempt to justify the MAP, the IOUs refer to "supply conductors often operating at increased thermal loads"[115] and to "the introduction of new high

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115 *Id*.

temperature conductors."[116] The proposed new footnote provides no information, however, regarding any new type of conductor, or operating thermal loads, or any specific rules or requirements for addressing such concerns. The proposed new footnote is in fact entirely devoid of any substantive information that utility and CIP engineers, contractors, inspectors and maintenance personnel could use to ensure that their facilities are designed, constructed, inspected and maintained in conformance with the new footnote. As a result, there is no way the MAP could be operationalized, and no realistic prospect of it making any meaningful contribution to the Commission's objective of reducing fire risks.

Finally, the Commission's existing rules provide sufficient means to address those circumstances in which an IOU may install new high temperature conductors or operate conductors at increased thermal loads. Rule 31.1 requires IOUs and CIPs to conform to "accepted good practice" in the event the conductors installed or conditions under which they will be operated are not addressed by the particulars of more specific rules contained in G.O. 95. In addition to this general obligation, pole owners have authority under D.98-10-058 to inform entities with facilities attached to their poles, or which may request authority to attach facilities, of any conditions that may require design or construction to standards that exceed the minimum requirements contained in G.O. 95. The new footnote that the MAP would add to Table 2 would add nothing useful to these provisions of existing law.

Because there is no evidence that the Commission's existing conductor clearance and sag requirements are insufficient to ensure a reasonable margin of fire

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[116] Phase 2 Workshop Report at B-151.

safety, and ample evidence exists that the IOUs' MAP is fundamentally flawed and would not make any constructive contribution to the Commission's goal of reducing fire risks, the Commission should reject it.

H. MAP No. 11—General Order 95, Rule 48: The Commission Should Adopt The Joint Electric Utilities' Proposal To Incorporate Reasonableness Into Rule 48.

In engineering construction and design, an absolute requirement to "not fail," *i.e.,* to be perfect, is technically unattainable. Yet the wording in G.O. 95, Rule 48 imposes the unachievable "will not fail" standard on both electric and communications entities in the design and construction of "structural members and their connection." While failure is forbidden under Rule 48, the Rule, paradoxically, makes allowances for the probability of failure in subsequent subsection 48.1 and in the example problems set forth in Appendix F. The IOUs' MAP corrects these internal inconsistencies in the rule, as well as the inconsistencies between Rule 44 and Rule 48 regarding whether the safety factors used to determine maximum working stresses are applied to loads set forth in Rule 43.

The IOU MAP eliminates both the inconsistencies within Rule 48 and the necessity of complying with an impossible standard. It *does not*, however, change the requirement that electric and communications entities use the existing, and intentionally conservative, Rule 43 loading criteria and Rule 44 safety factors. Thus, the removal of that language does not affect the safety of these facilities or otherwise increase the risk of fire.

CPSD, however, opposes the IOU MAP, not on the basis of any specific concern regarding loading criteria or safety factors, but instead on the general assertion that the proposal "lower[s] the safety requirements of line elements by removing the phrase "will

not fail."[117] CPSD's opposition is misguided. Rule 48's "aspirational"—and technically unattainable—no-fail standard, is at best little more than a useless Camelot-like declaration in a rule intended to establish rational, engineering-based and implementable construction and design criteria for utilities. At worst, the language creates potential liability for failure to adhere to an impossible standard or requires the expenditure of untold resources in an (ultimately fruitless) attempt to meet an impossible standard.

CPSD also suggests that the PRC "is nothing less than an attempt to lower the utilities' obligations and civil liabilities."[118] CPSD thus implicitly acknowledges that Rule 48's unattainable standard carries uncontemplated potential for civil liabilities against utilities. CPSD is correct as to the increased potential for liability, but incorrect in its opposition to the MAP. Liability comes not only from potential civil liability claims, but also from an otherwise unjustified and unforeseen increase in construction and maintenance costs—a fact that the Commission's Deputy Director of the Energy Division publicly criticizes. In a letter to the Executive Board of the G.O. 95/128 Rules Committee, Ken Lewis, Deputy Director of the CPUC's Energy Division, identified several deficiencies in Rule 48, noting that it, "if literally interpreted, would result in unnecessarily expensive transmission and distribution lines."[119] Any Commission determination to impose strict liability upon the IOUs and CIPs for failure to abide by this standard has profound implications for California utilities and their customers—who

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117 *See* Phase 2 Workshop Report at B-178.

118 *Id.*

119 *See* Letter dated December 14, 2009 to Executive Board, G.O. 95/128 Rules Committee from Ken Lewis, Deputy Director, Energy Division regarding G.O. 95 Rules for Overhead Line Construction. This letter is part of the record in this proceeding.

ultimately bear the cost of such liability—and should not be the result of an arbitrary artifact of a G.O. 95 design and construction rule. Moreover, CPSD's opposition fails to account for the fact that utilities must still design and construct consistent with the many interrelated provisions of Rules 43, 44 and 48 and that CPSD remains fully able to enforce those provisions even without the "will not fail" standard.

As stated above, the Phase 2 workshop participants identified significant G.O. 95, Section IV rule inconsistencies, and the Rule 48 revision proposed by the IOUs appropriately addresses those inconsistencies. CPSD, however, has proposed, apparently as alternative to the IOU MAP, an ordering paragraph to establish a "technical working group" to address possible changes to Section IV of G.O. 95. CPSD asserts that such a "comprehensive review of this section is necessary." Although the CIPs do not necessarily oppose the creation of a technical working group, the creation of such a group does not affect or undercut the need for adoption of the IOU MAP to address the issues created by the current "will not fail" language in Rule 48 as set forth above.

I. MAP No. 12—General Order 95, Rule 91.5: The Proposal by SDG&E to Require Marking of Communications Facilities Must be Rejected.

SDG&E's proposed rule to require marking of communications conductors and cables for the purposes of identifying ownership was first aired in Phase 1[120] and briefly advanced by CPSD as proposed Rule 31.7.[121] But CPSD later withdrew its support stating:

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[120] *See* Proposed Rule Changes of San Diego Gas & Electric Company on Order Instituting Rulemaking, R.08-11-005 (January 21, 2009), Appendix A, at 17

[121] The Consumer Protection and Safety Division's Proposed Rules to be Implemented in time for the Fall 2009 Fire Season, R.08-11-005 (March 6, 2009) Attachment A, at 4.

> CPSD agrees with various parties' comments that there are certain practical concerns that deserve further consideration and clarification in Phase 2. Therefore CPSD is withdrawing its proposed Rule 31.7 for consideration in Phase 1.[122]

Though CPSD suggested deferral to Phase 2, it *did not* raise the issue of marking of communications facilities in its December 16, 2009 filing of PRCs and, moreover, did not find SDG&E's proposal sufficiently meritorious to vote in its favor.[123] Similarly, SDG&E's proposal has not received support from the other major electric utilities in the State,[124] or consumer groups.[125]

SDG&E's proposal has not garnered support because there has been no evidence introduced in this proceeding (including at workshops) indicative of a legitimate problem arising from unmarked aerial communication facilities. At best the issue raises administrative challenges *limited to SDG&E and its service territory*. Such challenges are better addressed through an internal record-keeping process or some tracking mechanism, rather than a G.O. 95 rule.

As acknowledged by SDG&E, both the Northern California Joint Pole Association and the Southern California Joint Pole Committee ("SCJPC") have databases that track joint owners on a particular pole**.**[126] While SDG&E has chosen not to become a member of the SCJPC, the activities of these associations indicate that a system is already in place to address this issue for joint ownership facilities in a vast majority of

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122 Reply Comments of the Consumer Protection and Safety Division, R.08-11-005 (April 8, 2009), at 11.

123 Phase 2 Workshop at B-192 (documenting CPSD's neutral vote for SDG&E's marking proposal).

124 *Id.* (showing SCE and PG&E voting no on SDG&E's marking proposal).

125 *Id*. (showing DRA voting neutral on SDG&E's marking proposal).

126 See proposed Rule Changes Individually Submitted by San Diego Gas & Electric Company, R.08-11-005 (December 16, 2009), Attachment A, at 8.

the State, while also highlighting the fact that the issue raised by SDG&E is limited to its own service territory.

In addition, the proposal ignores the written records already available to SDG&E to identify facility ownership. As discussed during both Phase 1 and Phase 2 workshops, SDG&E solely owns its poles and CIPs must submit written applications to lease space from them. As a result, SDG&E has contact information for all CIPs on their poles, and communicates with CIPs—by email and otherwise—whenever there is a particular issue on a pole. SDG&E's pole attachment agreements also require CIPs to complete pole attachment applications containing pole loading calculations each time the CIP proposes an attachment. CIPs cannot attach to an SDG&E pole without its written approval given as a fully executed copy of the application. In turn, SDG&E keeps the original fully-executed application in its records so that SDG&E knows precisely when and which attachments CIPs have made. Finally, SDG&E also bills each of their lessees for pole attachments. Given all of these administrative trackers, SDG&E should be able to identify facilities on its poles and, in fact, *SDG&E voted in favor of a consensus rule requiring each pole owner to be able to determine all authorized entities that attach equipment on an owner's portion of a pole.*[127] Thus, any potential issue with identification of facility owners has already been addressed both as a matter of practice and now per the General Order.

SDG&E's failure to produce any evidence to support its proposed marking rule is compounded by the significant costs which would be incurred for its implementation. While SDG&E has acknowledged that its proposal would generate additional costs, it

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[127] Phase 2 Workshop Report at A-12 (setting forth the proposed consensus Rule 18B which would *(footnote continued)*

asserts that "[t]hese additional costs are likely to be minimal due to the ease of tagging poles and equipment during construction, inspections, and routine maintenance."[128] SDG&E, however, has provided no cost analysis to support such assertion. Indeed, the only cost estimate presented on this proposal was that of PG&E in Phase I. PG&E— an electric utility not a communications provider, who nonetheless owns overhead communications equipment— estimated that implementation of the marking rule "would require an expenditure of over $2.2 million above its current revenues to purchase and install the marking materials."[129] Moreover, SDG&E's MAP would impose ongoing expenses because tags fall off, get discolored, or incur some other damage which renders them useless. Continual monitoring would be required to ensure compliance.

Finally, there are practical reasons to avoid an identification obligation. For example, the ownership of communication lines can change often enough that a great number of marked facilities would be out of date, and therefore, of little use to those that are relying on them as a means of identifying the owner. Moreover, tags fade making identification difficult over time. In sum, the lack of evidence to support the necessity of this rule, the significant expenditure of costs required for implementation and ongoing compliance, and the impracticality of the use of tags as a means of identification of the ownership require rejection of SDG&E's proposed marking rule.

J. MAP No. 13—General Order 165, Section V: The MGRA and CPSD MAP Regarding Collection and Reporting of Fire Data Is Fundamentally Flawed and Should Be Rejected.

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impose such requirement).

[128] Phase 2 Workshop Report at B-187.

[129] Opening Comments of Pacific Gas and Electric Company on CPSD's Proposed Rules in Phase 1 of R.08-11-005, R.08-11-005 (March 27, 2009) at 19.

MGRA and CPSD propose revisions to General Order 165, Section V to require additional data collection and reporting by IOUs regarding fire incidents. This MAP would require IOUs to collect a significant amount of additional information on each and every fire incident attributable or allegedly attributable to their overhead electric distribution lines or transmission lines, including the "apparent cause" of each such fire incident, and to report such information annually to CPSD.[130] The information would be reported by the IOUs to CPSD on a confidential basis, but summaries would be released to the public as well as to State and local fire agencies. MGRA and CPSD claim that the additional data reported under the MAP could be used to evaluate and understand the causal mechanism leading to wildland fires and to help identify preventative measures to reduce such fires.[131]

MGRA and CPSD were no doubt well-intentioned in proposing this MAP, but the MAP is fundamentally flawed and incapable of serving the purpose they intend. It was opposed by every IOU and CIP during the workshops for a number of very good reasons. First, the MAP would require IOUs to compile and report additional detailed information on every single fire incident involving their facilities, no matter how minor, including incidents that are contained entirely within IOU buildings or structures and involve no personal injury or property damage and which do not cause or contribute to wildland fires. It is our understanding that the vast majority of fires involving IOU facilities are minor fires of this type. As a result, the MAP would require IOUs to incur significant additional time and expense[132] to compile and report a significant amount of

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130 Phase 2 Workshop Report at B-194.

131 *Id*. at B-194 to B-195.

132 PG&E estimated that implementation of MGRA's original proposal in regard to fire incident data

(footnote continued)

additional information to CPSD, the vast majority of which would not contribute in any way to reducing wildland fire risks.

Second, any additional data compiled and reported in the manner provided for by the MAP would inevitably be biased and of limited probative value. For any significant fire incidents, IOU personnel would have a natural inclination to report the facts and data in a manner most favorable to their employer. Under the new requirements the MAP would impose, there is no doubt that IOU attorneys would ensure self-serving statements, particularly any information reported pertaining to the cause or "apparent cause" of fire incidents. The MAP compounds this problem by failing to provide any means for any independent review or verification of the IOU data. And any third parties that may have facilities involved or allegedly involved in incidents reported by IOUs will have no means of responding to or correcting the IOU reports since under the MAP the data will be reported directly to CPSD by the IOUs on a confidential basis and with no prior notice to third parties. Without an effective means of ensuring independent verification, there will be no assurance that the data reported by IOUs will be accurate, complete, or free from bias. As a result, any additional data that may be reported to CPSD regarding fire incidents, and most particularly the "apparent cause" they may report, would be of little if any value.

Third, any additional information reported to the Commission under the MAP may be an attractive and inappropriate source of information for plaintiff's attorneys trolling for clients and new potential causes of action against utilities. It is not clear that this risk

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collection and reporting would have cost up to $2 million. *See* Phase 2 Workshop Report at B-200.

can be completely eliminated in all circumstances by filing the information on a confidential basis under Public Utilities Code § 583 and G.O. 66-C.

And finally, neither MGRA nor CPSD has explained what fire data pertinent to reducing wildland fire risks CPSD requires that it is not already receiving or able to obtain under existing Commission rules and authority or from existing public databases. The Commission already has ample authority to require IOUs to provide it with specific and detailed information regarding wildland fire incidents. It does not need any new overly broad rule requiring an additional annual report to CPSD to obtain such information. Moreover, a number of publicly available databases already exist and are regularly updated and maintained that provide more extensive data regarding wildland fires than the MAP would provide. These publicly available sources include CalFire's FRAP database, FEMA's National Fire Incident Reporting System and other national databases referenced in the Exponent Report introduced in this proceeding by the CIP Coalition.[133] There is thus simply no need for promulgation of a new rule by the Commission in this regard.

The MAP is thus fundamentally flawed and unnecessary. Any additional data that may be reported under it would be highly suspect, extremely burdensome to compile, of little probative value or benefit, and may promote further costly civil litigation. MGRA and CPSD fail to acknowledge these fundamental problems with the MAP and have provided no practical means of addressing them. As a result, the MAP should be rejected.

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[133] Opening Comments of AT&T in Phase 1 (March 27, 2009), Attachment A, Larry W. Anderson, *Study to Assess Fire Risk Associated with Collocated Communications Equipment (Wired Telephone Lines and Wireless Equipment) With Utility Power Lines on Poles* (March 27, 2009).

VII. ANCILLARY ISSUES

A. Cost Recovery.

With the exception of the Small LECs, the CIP Coalition is not taking a position on these issues of cost recovery for rate-of-return regulated companies. The Small LECs are submitting a separate brief regarding this issue.

B. Implementation Period for Rules Adopted in Phase 2.

The Commission should order two timelines for the implementation of new rules: a) consensus rules and b) non-consensus rules. The consensus rules should be implemented within 90 days of issuance of the final decision that they can be appropriately implemented. The input of the electric utilities will be informative on this point as a number of the Consensus Rules are found in G.O. 165. In contrast, the non-consensus rules should have an implementation period of 12 to 18 months. As is evident by the fact these are not consensus rules, these rules are generally more complex and often involve new practices and policies to be implemented.

In Phase1, CIPs were given slightly more than one year to implement new inspection requirements. This was in recognition of the development of a new inspection regime including operationalizing fire maps. In Phase 2, the CIPs are now faced with the prospect of implementing new inspection requirements throughout the fire risk areas in the State as well as transforming an interim requirement into a permanent requirement in Southern California.[134] This is not to say that the affected companies will not commence implementation procedures earlier. However, the

[134] In certain circumstances, the implementation period may need to be extended. For example, if the Commission were to adopt either the CPSD or SDG&E inspection MAPs the challenges faced by the CIPs would increase manifold as the requirement are not tied to any specific fire threat zones.

Commission's decision should make clear that finalizing any programmatic requirements for any new rules may take at least 12-18 months and that any audits by CPSD of any affected company should take into account this implementation.

VIII. CONCLUSION

For the foregoing reasons, the Commission should accept the CIP Coalition's recommendations discussed herein.

Dated: September 3, 2010

Respectfully submitted on behalf of the CIP Coalition,

/s/

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ATTACHMENT

Exhibit B

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Education
PhD – Mechanical Engineering (major field: combustion), University of California, Berkeley, 2007
MS – Fire Protection Engineering, Worcester Polytechnic Institute, 2002
BS – Mechanical Engineering, Worcester Polytechnic Institute, 2000

Professional Engineer Licensure
State of California, Licensed Professional Engineer # FP1676, Fire Protection Engineering

Fire Investigation Training
California State Fire Marshal – Fire Investigation IA (40 hours)

Overview
Chris Lautenberger received an MS in Fire Protection Engineering from Worcester Polytechnic Institute (WPI) with a thesis related to computational fluid dynamics modeling of fires, and a PhD in Mechanical Engineering (major area: Combustion) from the University of California at Berkeley with a dissertation related to materials' flammability and fire modeling. Before joining Reax Engineering, his work experience included fire litigation support as an independent consultant as well as building code consulting and performance-based design of fire and life safety systems at Arup Fire (San Francisco, CA) and Code Consultants, Inc. (St. Louis, MO). In addition to working for Reax Engineering Inc., Chris is a researcher at UC Berkeley's Combustion and Fire Processes Laboratory where he conducts research on materials' flammability and pyrolysis, ignition and flame spread, computer fire modeling, and fire development in buildings.

As a licensed Fire Protection Engineer, Dr. Lautenberger's work combines real-world Fire Protection Engineering experience, including knowledge of fire/building codes and related standards, with technical aspects of fire litigation and fire protection engineering such as fire dynamics, combustion, heat transfer, fluid mechanics, thermodynamics, flammability, ignition, and fire spread. With more than 10 years of experience applying fire models in support of building design, fire litigation, and scientific research, one of Dr. Lautenberger's areas of specialization is modeling of fires and related phenomena, including: smoke, heat, and toxic species transport; sprinkler and smoke detector activation; turbulent flames; condensed-phase pyrolysis/burning processes; piloted and auto ignition of combustible solids; ignition of fuel beds by heated particles, sparks, and fire brands; and flame spread and fire growth.

Experience
8/08 – present **Reax Engineering Inc.** Berkeley, CA *Founding Partner and Principal Engineer*
Representative activities:

- Fire protection engineering – design of fire and life safety systems, performance-based design
- Fire litigation support – theory, analysis, modeling, codes & standards, failure analysis
- Fire dynamics analyses – flames & plumes, flashover, glass breakage, detector activation, etc.
- Forensic fire reconstruction, fire timeline development, fire development modeling
- Prediction of smoke and heat release rates
- Determination of time to untenability or incapacitation by smoke or heat

- Materials and product flammability assessment – ignition, burning, flame spread
- Material pyrolysis property estimation from small-scale fire test data
- Computational fluid dynamics, fire and smoke modeling, heat transfer analysis
- Sizing of smoke exhaust systems
- Fire inspections/origin and cause determination

Selected recent projects:

- Fire modeling for triple-fatality apartment fire: fire timeline development and fire reconstruction, calculation of glass breakage and smoke detector activation times in apartment of fire origin and adjacent apartments (Salem, OR)
- Fire reconstruction for fatal apartment fire: Inter-apartment fire spread, time to smoke detector activation, building code issues (Carrboro, NC)
- Quantification of heat and smoke release rates of Breda Light Rail Vehicles in the San Francisco Central Subway using fire growth modeling and small-scale fire testing (San Francisco, CA)
- Sizing of the required atrium smoke exhaust rate in the new Student Union Building at San Jose State University (San Jose, CA)
- Development of a model for ignition of HEPA filters by embers at the Hanford nuclear waste treatment plant (Richland, WA)
- Design of FM-200 clean agent fire suppression system for PG&E substation (San Mateo, CA)
- Computational Fluid Dynamics (CFD) modeling of blast wave
- Determination of origin of alleged arson fire (Modesto, CA)
- Analysis of code issues related to residential gas explosion (Las Vegas, NV)
- Detailed CFD modeling of fluid flow and heat & mass transfer in a biomass pyrolysis reactor
- Thermodynamic analysis of non-traditional methods for carbon capture and sequestration

12/07 – present **University of California, Berkeley** *Post Doctoral Researcher*

- Conducting research on NSF Grant 0730556, "Tackling CFD Modeling of Flame Spread on Practical Solid Combustibles"
- Assessing predictive capabilities of Fire Dynamics Simulator (FDS) for simulating flame spread and fire growth in buildings
- Modifying subroutines to improve predictive capabilities of FDS for flame spread modeling
- Further developing pyrolysis model and material property estimation techniques needed to simulate the pyrolysis of real-world solid fuels (http://code.google.com/p/gpyro)
- Developing computer model for ignition of fuel beds by hot particles and fire brands to predict ignition of fuel beds and initiation of spot fires

1/03 – 8/08 **Independent technical consultant for fire-related litigation and research** Berkeley, CA

- Provided litigation support services for several fire-related cases involving explosions, wildland fire behavior, ignition by embers, compartment/structure fires, and vehicle fires
- Developed several FDS models in support of expert witness testimony, including fire growth, toxic species (carbon monoxide) production, and smoke detector activation
- Critically analyzed FDS models developed by opposing sides to identify weaknesses

1/02 – 6/08 **Arup Fire** San Francisco, CA *Fire Protection Engineer*

- Assisted clients with fire safety design and achieving code compliance or performance-based solutions for hospitals, casinos, malls, libraries, schools, museums, airports, office buildings
- Performed egress analyses to determine required exit capacity and estimate Required Safe Egress Time (RSET) in proposed buildings
- Applied FDS to simulate smoke and heat transport from fires in proposed buildings to determine the available safe egress time (ASET)
- Developed and programmed a CFAST-based Monte-Carlo fire simulator
- Performed FDS simulations of flame spread and fire growth in a rail vehicle and used full-scale experimental data to calibrate the model

10/00 – 12/01 **FM Global Research** Norwood, MA
- Examined existing soot formation and oxidation models in the literature and used this research to postulate a new engineering soot model that is compatible with FDS
- Worked with FM Global and NIST personnel to add this new model for soot formation and oxidation to FDS, and performed simulations of laminar and turbulent diffusion flames

5/00 – 8/00 **Code Consultants, Inc.** Saint Louis, MO
- Responsible for examining proposed building designs for compliance with relevant codes
- Performed engineering analyses to support equivalencies

Dissertation and Thesis

1/03 – 12/07 **Ph. D. Dissertation** *University of California, Berkeley*
- Developed a pyrolysis/material decomposition model (Gpyro) to simulate the gasification, pyrolysis, and combustion of condensed-phase fuels
- Developed a novel optimization technique that uses a genetic algorithm to extract the material pyrolysis properties needed for simulation of solid-phase pyrolysis from bench-scale fire tests
- Performed FDS-based simulations of ignition, flame spread, and fire growth in normal and reduced gravity environments as part of a NASA-sponsored project

9/00 – 12/01 **MS Thesis** *Worcester Polytechnic Institute*
- Developed a novel model for soot formation/oxidation in non-premixed flames
- Implemented model in FDS to calculate soot formation and flame radiation

8/98 – 5/99 **Major Qualifying Project (MQP)** *Worcester Polytechnic Institute*
- Developed an experimental program and ran several real-scale room/corner fire tests in WPI's room calorimeter to evaluate the flame spread characteristics of composite wall linings

Peer Reviewed Publications

1. Lautenberger, C., de Ris, J., Dembsey, N.A., Barnett, J.R. & Baum, H.R., "A Simplified Model for Soot Formation and Oxidation in CFD Simulation of Non-premixed Hydrocarbon Flames," *Fire Safety Journal* **40** 141-176 (2005).
2. Lautenberger, C., Zhou, Y.Y. & Fernandez-Pello, A.C., "Numerical Modeling of Convective Effects on Piloted Ignition of Composite Materials," *Combustion Science and Technology* **177** 1231-1252 (2005).
3. Lautenberger, C. & Fernandez-Pello, A.C., "Approximate Analytical Solutions for the Transient Mass Loss Rate and Piloted Ignition Time of a Radiatively Heated Solid in the High Heat Flux Limit," *Fire Safety Science* **8** 445-456 (2005).
4. Lautenberger, C., Rein, G. & Fernandez-Pello, A.C., "The Application of a Genetic Algorithm to Estimate Material Properties for Fire Modeling from Bench-Scale Fire Test Data," *Fire Safety Journal* **41** 204-214 (2006).
5. Rein, G., Lautenberger, C., Fernandez-Pello, A.C., Torero, J.L. & Urban, D.L., "Application of Genetic Algorithms and Thermogravimetry to Determine the Kinetics of Polyurethane Foam in Smoldering Combustion," *Combustion and Flame* **146** 95-108 (2006).
6. Rich, D., Lautenberger, C., Torero, J.L., Quintiere, J.G. & Fernandez-Pello, C., "Mass Flux of Combustible Solids at Piloted Ignition," *Proceedings of the Combustion Institute* **31** 2653-2660 (2007).
7. Kwon, J.-W., Dembsey, N.A., & Lautenberger, C.W., "Evaluation of FDS v4: Upward Flame Spread," *Fire Technology* **43** 255-284 (2007).
8. Avila, M.B., Dembsey, N.A., Kim, M.E., Lautenberger, C., & Dore, C., "Fire Characteristics of Polyester FRP composites with Different Glass Contents," *Composites Research Journal* **2** 1-14 (2008).
9. Lautenberger, C., Kim, E., Dembsey, N. & Fernandez-Pello, C., "The Role of Decomposition Kinetics in Pyrolysis Modeling – Application to a Fire Retardant Polyester Composite," *Fire Safety Science* **9** 1201-1212 (2008).
10. Dodd, A.B., Lautenberger, C. & Fernandez-Pello, A.C., "Numerical Examination of Two-Dimensional Smolder Structure in Polyurethane Foam," *Proceedings of the Combustion Institute* **32** 2497-2504 (2009).
11. Lautenberger, C. & Fernandez-Pello, A.C., "Generalized Pyrolysis Model for Combustible Solids," *Fire Safety Journal* **44** 819-839 (2009).

12. Lautenberger, C. & Fernandez-Pello, A.C., "A Model for the Oxidative Pyrolysis of Wood," *Combustion and Flame* **156** 1503-1513 (2009).
13. Fereres, S., Lautenberger, C., Fernandez-Pello, C., Urban, D.L., & Ruff, G.A., "Mass Loss Rate at Ignition in Reduced Pressure Environments," submitted to *Proceedings of the Combustion Institute* (2010).
14. Hadden, R., Scott, S., Lautenberger, C., & Fernandez-Pello, A.C., "Ignition of Combustible Fuel Beds by Hot Particles: an Experimental and Theoretical Study," submitted to *Fire Technology* (2010).
15. Dodd, A.B., Lautenberger, C., & Fernandez-Pello, A.C., "Computational Modeling of Smolder Combustion and Spontaneous Transition to Flaming," to be submitted to *Combustion and Flame* (2010).

Book Chapters

1. Lautenberger, C., Torero, J.L. & Fernandez-Pello, A.C., "Understanding Materials Flammability," in *Flammability Testing of Materials Used in Construction, Transport and Mining*, Edited by V. Apte, Woodhead Publishing, Cambridge, UK pp. 1-21, 2006.
2. Lautenberger, C. & Fernandez-Pello, A.C., "Pyrolysis Modeling, Thermal Decomposition, and Transport Processes in Combustible Solids," in *Transport Phenomena in Fires*, Edited by M. Faghri and B. Sunden, WIT Press, Billerica, MA pp. 209-248, 2008.
3. Lautenberger, C. & Fernandez-Pello, A.C., "Spotting Ignition of fuel beds by firebrands," in *Computational Methods and Experimental Measurements XIV*, Edited by C.A. Brebbia and G.M. Carlomango, WIT Press, Billerica, MA pp. 603-612, 2009.
4. Lautenberger, C. & Hostikka, S., "Large Scale Fire Modeling," in *Flame Retardancy of Polymeric Materials*, Second Edition, Edited by C.A. Wilkie and A.B. Morgan, Marcel Dekker pp. 551 – 585, 2010.

Selected Conference Publications and Technical Reports

1. Beyler, C., Hunt, S., Lattimer, B., Iqbal, N., Lautenberger, C., Dembsey, N., Barnett, J., Janssens, M., & Dillon, S. "Prediction of ISO 9705 Room/Corner Test Results". United States Department of Transportation. United States Coast Guard Research and Development Center. Washington, DC. 1999.
2. Lautenberger, C., Stevanovic, A., Rich, D., & Torero, J., "Effect of Material Composition on Ignition Delay of Composites," *Composites 2003*, Anaheim CA, October 2003.
3. Lautenberger, C., Stevanovic, A., Rich, D., Torero, J. & Fernandez-Pello, A.C., "An Experimental and Theoretical Study on the Ignition Delay Time of Composite Materials," *Western States Section/The Combustion Institute*, Los Angeles CA, October 2003.
4. Rein, G., Lautenberger, C., Fernandez-Pello, A.C., Torero, J.L. & Urban, D.L., "Derivation of the Kinetics Parameters of Polyurethane Foam Using Genetic Algorithms," *Fourth Joint Meeting of the US Sections of the Combustion Institute*, Philadelphia PA, March 2005.
5. Rein, G., Lautenberger, C. & Fernandez-Pello, A.C., "On the Derivation of Polyurethane Kinetics Parameters Using Genetic Algorithms and its Application to Smoldering Combustion," *Fourth International Conference on Computational Heat and Mass Transfer*, Paris France, Vol. 1 pp. 578-584, May 2005.
6. Rein, G., Lautenberger, C. & Fernandez-Pello, A.C., "Using Genetic Algorithms to Derive the Parameters of Solid-Phase Combustion from Experiments," *20th International Colloquium on the Dynamics of Explosions and Reactive Systems*, Montreal, Canada, August 2005.
7. Rich, D., Lautenberger, C., McAllister, S. & Fernandez-Pello, A.C., "Microgravity Flame Spread Rates Over Samples of Polymer and Polymer/Glass Composites," *Western States Section/The Combustion Institute*, Boise ID, March 2006.
8. Coles, A., Wolski, A., Lautenberger, C.W., & Dembsey, N.A., "Building Code Requirements for Performance Based Designs and Fire Modeling", *Composites 2006*, St. Louis, MO, October 2006.
9. Lautenberger, C., McAllister, S., Rich, D., & Fernandez-Pello, C., "Modeling the Effect of Environmental Variables on Opposed-Flow Flame Spread Rates with FDS," *International Congress on Fire Safety in Tall Buildings*, Santander, Spain, October 2006.
10. McAllister, S., Rich, D., Lautenberger, C., & Fernandez-Pello, C., "Modeling Microgravity and Normal Gravity Opposed Flame Spread over Polymer/Glass Composites," *45th AIAA Aerospace Sciences Meeting and Exhibit*, Reno, NV, January 2007, AIAA Paper 2007-740.
11. Lautenberger, C., McAllister, S., Rich, D., & Fernandez-Pello, C., "Effect of Environmental Variables on Flame Spread Rates in Microgravity," *45th AIAA Aerospace Sciences Meeting and Exhibit*, Reno, NV, January 2007, AIAA Paper 2007-383.
12. Chatterjee, P., de Ris, J.L., & Lautenberger, C.W., "A General Combustion Model for Radiation Dominated Non-premixed Flames," *Fifth International Seminar on Fire and Explosion Hazards*, Edinburgh, UK, 2007.

13. McAllister, S., Rich, D., Lautenberger, C., Fernandez-Pello, C. & Yuan, Z.G., "Modeling Microgravity and Normal Gravity Flame Spread Rates over Samples of Polymer and Polymer/Glass Composites," *Fifth International Seminar on Fire and Explosion Hazards*, Edinburgh, UK, April 2007.
14. Lautenberger, C. & Fernandez-Pello, C., "A Generalized Pyrolysis Model for Combustible Solids," *Fifth International Seminar on Fire and Explosion Hazards*, Edinburgh, UK, April 2007.
15. Coles, A., Wolski, A., & Lautenberger, C., "Using Fire Dynamics Simulator for Fire Growth Modeling," *Interflam 2007*, London, UK, September 2007.
16. Dembsey, N., Avila, M., Kim, E., Lautenberger, C., & Dore, C., "Fire Characteristics of Polyester FRP Composites with Different Glass Contents," *Composites & Polycon 2007* Tampa, FL, October 2007.
17. Lautenberger, C. & Fernandez-Pello, A.C., "Modeling Ignition of Combustible Fuel Beds by Embers and Heated Particles," *Forest Fires 2008*, 2008.
18. Coles, A., Lautenberger, C., Wolski, A., Smits, B., & Wong, K., "Using Computer Fire Modeling to Reproduce and Predict FRP Composite Fire Performance," *Composites & Polycon 2009*, 2009.
19. Kim, E., Dembsey, N., & Lautenberger, C., "Parameter Estimation for Pyrolysis Modeling Applied to Polyester FRP Composites with Different Glass Contents," *Fire and Materials 2009*, 2009.
20. Lautenberger, C., Wong, W., Dembsey, N., Coles, A., & Fernandez-Pello, C., "Large-Scale Turbulent Flame Spread Modeling with FDS5 on Charring and Noncharring Materials," *Fire and Materials 2009*, 2009.
21. Coles, A., Wolski, A., & Lautenberger, C., "Predicting Design Fires in Rail Vehicles," *13th International Symposium on Aerodynamics and Ventilation of Vehicle Tunnels* (ISAVVT 13), 2009.
22. Dodd, A.B., Lautenberger, C., & Fernandez-Pello, A.C. "Numerical Modeling of Smoldering Combustion and Transition to Flaming," *Sixth US National Combustion Meeting*, University of Michigan, Ann Arbor, MI, 2009.
23. Scott, S, Hadden, R., Fereres, S., Lautenberger, C., & Fernandez-Pello, A.C., "Ignition of Combustible Fuel Beds by Embers and Heated Particles," *Western States Section/The Combustion Institute*, Irvine, CA, October 2009.
24. Fereres, S., Lautenberger, C., Fernandez-Pello, C., Urban, D., & Ruff, G., "Effect of Ambient Pressure on Mass Loss Rate at Piloted Ignition," *Western States Section/The Combustion Institute*, Boulder, CO, March 2009.

Selected Presentations and Invited Lectures

1. "A Practical CFD Model for Soot Formation and Flame Radiation," *International Conference on Engineered Fire Protection Design*, San Francisco, CA, June 13, 2001.
2. "Effect of Material Composition on Ignition Delay of Composites," *Composites 2003 Convention and Trade Show*, Anaheim, CA, October 2, 2003.
3. "Experimental and Theoretical Study on Ignition Delay of Composites," *Western States Section of the Combustion Institute Fall 2003 Meeting*, Los Angeles, CA, October 20, 2003.
4. "Approximate Analytical Solutions for the Transient Mass Loss Rate and Piloted Ignition Time of a Radiatively Heated Solid in the High Heat Flux Limit", *The Eighth International Symposium on Fire Safety Science*, Beijing, China, September 20, 2005.
5. "Effect of Environmental Variables on Flame Spread Rates in Microgravity", *45th AIAA Aerospace Sciences Meeting and Exhibit*, Reno, NV, January 8, 2007.
6. "Generalized Pyrolysis Model for Combustible Solids," *2007 Annual Fire Conference*, National Institute of Standards and Technology, Gaithersburg, MD, April 4, 2007.
7. "Generalized Pyrolysis Model for Combustible Solids," *5th International Seminar on Fire and Explosions Hazards*, Edinburgh, UK, April 24, 2007.
8. "Generalized Pyrolysis Model for Combustible Solids," FM Global Research, Norwood, MA, June 19, 2007 (invited seminar).
9. "Pyrolysis Modeling – What Level of Accuracy is Needed to Match Current Gas-Phase Accuracy?," *The Ninth International Symposium on Fire Safety Science*, Fire Spread Modeling Workshop, Karlsruhe, Germany, September 21, 2008 (invited presentation).
10. "Estimating Material Properties for Numerical Pyrolysis Modeling from Laboratory Experiments," *The Ninth International Symposium on Fire Safety Science*, Karlsruhe, Germany, September 21, 2008 (invited presentation).
11. "The Role of Decomposition Kinetics in Pyrolysis Modeling – Application to a Fire Retardant Polyester Composite," *The Ninth International Symposium on Fire Safety Science*, Karlsruhe, Germany, September 26, 2008.
12. "Fire Growth Modeling in Buildings – Where We Are and Where We Need to Be," IIE Seminar, University of Edinburgh, Edinburgh, UK, October 30, 2008 (invited seminar).

13. "Some Unsolved Problems in Fire Dynamics: The Needed Physics and Mathematics," *Mathematical Problems in Fire Safety Engineering Joint Workshop*, Edinburgh, UK, October 31, 2008 (invited seminar).
14. "Large-Scale Turbulent Flame Spread Modeling with FDS5 on Charring and Noncharring Materials," *Fire and Materials 2009*, San Francisco, CA, January 26, 2009.
15. "Fire Growth Modeling: Small-Scale Flammability Tests to Large Scale Fire Behavior," *ASTM E5 Research Review*, Vancouver, BC, June 15, 2009 (invited presentation).

Publication and Presentation Awards

- Best Paper Overall at *Composites & Polycon 2007*, Tampa, FL, October 2007 for Dembsey, N. *et al.*, "Fire Characteristics of Polyester FRP Composites with Different Glass Contents," presented by N. Dembsey.
- Best paper (second prize) at the *Fifth International Seminar on Fire and Explosion Hazards*, Edinburgh, UK, April 2007 for Lautenberger, C. & Fernandez-Pello, C., "Generalized Pyrolysis Model for Simulating Charring, Intumescent, Smoldering, and Noncharring Gasification," presented by C. Lautenberger.

Journal Referee / Peer Review

- *Combustion Science and Technology*
- *Experimental Thermal and Fluid Science*
- *Fire and Materials*
- *Fire Safety Journal*
- *Fire Safety Science* (IAFSS Symposia)
- *Fire Technology*
- *International Journal of Wildland Fire*
- *Journal of Fire Protection Engineering*
- *Proceedings of the Combustion Institute*

Conference Advisory Boards/Technical Committees

- Member of Scientific Advisory Board for *International Congress on Combustion and Fire Dynamics*, Santander, Spain, October 2010
- Member of Technical Program Committee (Compartment Fires) for the *Tenth International Symposium on Fire Safety Science* (IAFSS Symposium), College Park, MD, June 2011

Honors, Scholarships, and Fellowships

- NASA Graduate Student Researcher Program Grant #NNC-04HA08H, "Piloted Ignition and Flame Spread on Composite Materials in Partial and Normal Gravity," 2004 – 2007
- Society of Fire Protection Engineers (St. Louis Chapter) Scholarship, 2001
- Salamander Honorary Fire Protection Engineering Society, 2000
- Marsh Risk Consulting Scholarship, 2000
- A.L. Brown SFPE Scholarship, 2000
- Skull Senior Honorary Society, 1998

Professional Societies

- Society of Fire Protection Engineers (SFPE)
- National Fire Protection Association (NFPA)
- International Association of Fire Safety Science (IAFSS)
- American Society for Testing and Materials (ASTM)

David B. Rich, PhD

Reax Engineering, Inc.
2342 Shattuck Ave., #127
Berkeley, CA 94704

t: 510-629-4930 x803
f: 510-550-2639
rich@reaxengineering.com

Current Positions

Principal Engineer, Reax Engineering Inc., Berkeley, CA
Post Doctoral Researcher, University of California, Berkeley, Combustion and Fire Processes Laboratories
Adjunct Professor, Santa Clara University, Santa Clara, CA

Education

PhD – Mechanical Engineering (major field: combustion), University of California, Berkeley, 2006
MS – Mechanical Engineering, University of California, Berkeley, 2002
BS – Mechanical Engineering, University of California, Berkeley, 2000

Overview

Dr. Rich brings a diverse background to the field of engineering with research and development experience in combustion, bioengineering and mechanical design in both the academic and private sector. Dr. Rich is an Adjunct Professor of thermal fluid sciences at Santa Clara University, conducts Post Doctoral research in the Combustion and Fire Processes Laboratory at the University of California, and provides engineering support to the private sector in support of product design, legal issues and infrastructure development. Dr. Rich has background as a Rescue Captain and Paramedic with the San Francisco Fire Department which brings a pragmatic and disciplined approach to his work. His work there included authorship of municipal disaster plans and training of top level city administrators in implementing them, which developed skills in leadership and project management.

Dr. Rich's primary area of expertise is development of experimental platforms for the study of fire and combustion phenomena including research into material flammability, internal combustion engine performance, building smoke control and studies of vehicle emissions. Methods include IR thermometry, particle image velocimetry, laser induced fluorescence, continuous mass loss measurement, high speed and IR videography, engine dynamometers, gas sampling, and a range of analog and computer measurement techniques. Work in engine performance, includes mini rotary engine research, piezo-ceramic spark ignition technology and emissions and alternative fuels research. This work includes development of alternative fuels and mitigation of engine pollutants and particulate emissions using a number of innovative methods like ammonia treatment, water injection, bio-fuels, particle traps, afterburning, and radio isotope tracing of particulates. NASA sponsored fire safety research investigated flame propagation rates of through porous media in microgravity and investigation of the mechanisms governing ignition delay and flame spread of materials, particularly composites, intended for use on spacecraft. Building studies include scale modeling and laser imaging of building smoke flows, particularly for innovative ventilation schemes. In bioengineering, projects include tumor ablation with combustion catalytic probes, heat transfer mechanisms and energetics of birds and measurements of the shear strength of post operative bone.

Experience

8/08 – present **Reax Engineering Inc.** Berkeley, CA *Founding Partner and Principal Engineer*

- Development of experimental programs in support of product development, thermodynamics, fluid mechanics, heat transfer, instrumentation, control and data acquisition
- Fire litigation support – analysis, modeling, and theory, fire inspections/investigations
- Computer fire modeling: forensic fire reconstruction, prediction of heat release rate via fire growth modeling, fire timeline recreation, time to untenability/incapacitation by smoke or heat, calculation of smoke detector and sprinkler activation times, onset of flashover
- Ignition and flame spread of materials, evolved species, heat transfer and deformation

12/07 – present **University of California, Berkeley** *Post Doctoral Researcher*
- Development of carbon neutral fuels from cellulosic feedstock
- Scale model and laser imaging of building smoke flows for innovative ventilation (under floor, natural) systems and validation of FDS models
- Combustion testing and modeling to characterize fuels and measure energy efficiency of specially developed stoves for use in developing countries (http://darfurstoves.org/)

1/07 – 8/08 **Arup Fire** San Francisco, CA *Fire Protection Specialist*
- Worked in conjunction with engineering teams, architects, and approving authorities, to develop integrated fire safety strategies for buildings and transportation systems.
- Applied current fire safety procedures including performance based design supported by analytical and numerical models.
- Developed and currently manage a wind tunnel research program investigating smoke flow in large structures subject to wind pressures.

9/00 – 12/06 **University of California, Berkeley** *Graduate Student Researcher*
- Served as experimental lead on Forced Ignition and Flame Spread Test (FIST) project, a NASA funded research program to assess flammability of materials in terrestrial and reduced gravity conditions. This work included three tours on NASA's microgravity research aircraft.
- Responsibilities included experimental program development and management, cost control and collaboration with engineering groups at NASA's Glenn Research Center, Cleveland.

9/00 – 8/08 **Independent technical consultant for fire-related litigation and research** Berkeley, CA
- Conducted laboratory experiments, numerical modeling, deposition review, and background research in support of fire related litigation, particularly cause and origin. Projects included vehicle, industrial and residential structure fires including the urban wildland interface. Fire causes included electrical failure, liquid fires, self-heating to ignition, and mechanical failure.
- Developed exhaust emission mitigation technologies for several engine types including use of bio-diesel and water and ammonia injection technologies.

06/99 – 09/00 **Mide Technology Corporation** Cambridge, MA *Engineer*
- Developed and managed engineering projects for private and government clients applying "smart materials" (shape memory alloys, super absorbent gels, piezo ceramics).

07/91 – 06/99 **San Francisco Fire Department** San Francisco, CA *Paramedic/Rescue Captain*
- Provided 911 emergency services and community disaster training to the County of San Francisco with the San Francisco Department of Public Health and Fire Department.
- Implemented a federally funded multi-agency program to manage causalities of nuclear, biological or chemical weapons and wrote the SFFD Prehospital Medical Disaster Plan.

Selected Publications

1. Bar-Ilan, A., Rich, D., Rein, G., & Fernandez-Pello, A.C., "Flow-Assisted Flame Propagation through a Porous Combustible in Microgravity," *Western States Section/The Combustion Institute*, San Diego, CA, 2002.
2. Cheng, E.S., Rich, D., Dibble R.W., & Buckholz, B.A., "Quantifying the Contribution of Lubrication Oil to Particulate Emissions from a Diesel Engine," *Journal of the Society of Automotive Engineers*, 2003.
3. Lautenberger, C., Stevanovic, A., Rich, D., & Torero, J., "Effect of Material Composition on Ignition Delay of Composites," *Composites 2003*, Anaheim CA, October 2003.
4. Lautenberger, C., Stevanovic, A., Rich, D., Torero, J. & Fernandez-Pello, A.C., "An Experimental and Theoretical Study on the Ignition Delay Time of Composite Materials," *Western States Section/The Combustion Institute*, Los Angeles CA, October 2003.
5. Rich, D., Lautenberger, C., Stevanovic, A., Mehta, S., Torero, J., Yuan, Z., Ross, H., Fernandez-Pello, C., "Piloted Ignition of Polypropylene/Glass Composites in a Forced Air Flow," *7th International Workshop on Microgravity Combustion and Chemically Reacting Systems*, Cleveland, OH, 2003.
6. Lautenberger, C., Rich, D., Yuan, Z., & Fernandez-Pello, C., "Modeling Ignition of Solid Combustibles in Normal and Micro Gravity," Work in progress poster presented at the *30th International Symposium on Combustion*. Chicago, IL, 2004.

7. Rich, D., Lautenberger, C., Hernandez, J., & Fernandez-Pello, A.C. "Effect of Environmental Variables on Critical Pyrolysate Mass Flux for Piloted Ignition of PMMA and PP/GL Composite," *Proceedings of the 4th Mediterranean Combustion Symposium*, Lisbon, Portugal, 2005.
8. Rich, D., Lautenberger, C., McAllister, S. & Fernandez-Pello, A.C., "Microgravity Flame Spread Rates Over Samples of Polymer and Polymer/Glass Composites," *Western States Section/The Combustion Institute*, Boise ID, March 2006.
9. Lautenberger, C., McAllister, S., Rich, D., & Fernandez-Pello, C., "Modeling the Effect of Environmental Variables on Opposed-Flow Flame Spread Rates with FDS," *International Congress on Fire Safety in Tall Buildings*, Santander, Spain, October 2006.
10. Rich, D., Lautenberger, C., Torero, J.L., Quintiere, J.G. & Fernandez-Pello, C., "Mass Flux of Combustible Solids at Piloted Ignition," *Proceedings of the Combustion Institute* **31** 2653-2660 (2007).
11. McAllister, S., Rich, D., Lautenberger, C., & Fernandez-Pello, C., "Modeling Microgravity and Normal Gravity Opposed Flame Spread over Polymer/Glass Composites," *45th AIAA Aerospace Sciences Meeting and Exhibit*, Reno, NV, January 2007, AIAA Paper 2007-740.
12. Lautenberger, C., McAllister, S., Rich, D., & Fernandez-Pello, C., "Effect of Environmental Variables on Flame Spread Rates in Microgravity," *45th AIAA Aerospace Sciences Meeting*, Reno, NV, Jan. 2007, AIAA 2007-383.
13. McAllister, S., Rich, D., Lautenberger, C., Fernandez-Pello, C. & Yuan, Z.G., "Modeling Microgravity and Normal Gravity Flame Spread Rates over Samples of Polymer and Polymer/Glass Composites," *Fifth* International Seminar on Fire and Explosion Hazards, Edinburgh, UK, April 2007.

Other Publications and Projects

- San Francisco Public Utilities Commission, Emergency Operations Plan and Field Operations Guide, 2008.
- San Francisco Fire Department PreHospital Emergency Operations Plan and Field Operations Guide, 2000.
- Darfur Stoves Project, Director of combustion testing to characterize fuels and measure energy efficiency of specially developed stoves for use in developing countries.

Journal Referee / Peer Review

- *Fire Safety Journal*
- *Fire Science and Technology*
- *Fire Technology*
- *Mediterranean Combustion Symposia*
- *Proceedings of the Combustion Institute*

Professional Societies

- Society of Fire Protection Engineers (SFPE)
- National Fire Protection Association (NFPA)
- American Society for Testing and Materials (ASTM)

Exhibit B

PROFESSOR CARLOS FERNANDEZ-PELLO
Department of Mechanical Engineering
6105A Etcheverry Hall
University of California
Berkeley, CA 94720-1740

Education:

Aeronautical Engineering, Polytechnic University of Madrid, Spain, Eng. 1968
Mechanical Engineering, University of California, San Diego, M.S., 1973
Mechanical Engineering, University of California, San Diego, Ph.D., 1975
Aeronautical Engineering, Polytechnic University of Madrid, Spain, Dr. Eng., 1976

Professional Appointments:

Administrative

2003-present	Associate Dean, Graduate Division, University of California, Berkeley
1998-2000	Vice-Chairman of the Graduate Council at University of California, Berkeley, CA
1996-2000	Vice-Chairman of Graduate Studies, Dept of Mechanical Engineering, University of California, Berkeley

Academic/Research

1986-present	Professor, Dept. of Mechanical Engineering, University of California, Berkeley, CA
1983-present	Associate Faculty Scientist, Energy & Environment Division, Lawrence Berkeley Laboratory, Berkeley, CA
1982-1986	Associate Professor, Dept. of Mechanical Engineering, University of California, Berkeley, CA
1980-1982	Assistant Professor, Dept. of Mechanical Engineering, University of California, Berkeley, CA
1977-1979	Research Staff Member, Dept. of Mechanical & Aerospace Engineering, Princeton University, Princeton., NJ
1975-1976	Post-doctoral Research Fellow, Division of Engineering and Applied Physics, Harvard University, Boston, MA

Synergistic Activities:

Teaching:	*Teaches courses in Heat Transfer, Thermodynamics, and Combustion*
Research*:*	*Heads the Combustion Processes Laboratory where research is conducted in heat transfer, thermodynamic and combustion. The laboratory also helps industry in the above subjects*
Service to Industry:	*Consults for industry in subject related to Heat transfer and combustion*

Editorial Board: *Progress in Energy and Combustion Science* (1995-2008*)*
Combustion Science and Technology (1992-present*)*
Combustion and Flame (1994-present*)*

Exhibit B

Publications in Peer Reviewed Archival Journals and Conference Proceedings (2001-2009)

"Microgravity Ignition Delay of Solid Fuels in Low Velocity Flows" *AIAA Journal*, Vol. 39, No. 12, 2336-2342, 2001 (with M. Roslon, S. Olenic, D. Walther, J.L. Torero, and H. D. Ross).

"Oxidizer Flow Effects on the Flammability of Solid Combustible Materials" *Combustion Science and Technology,* V. 164, 253-278, 2001 (with J. L. Cordova, J.L. Torero, and D.C. Walther)

"Theoretical Prediction of Microgravity Ignition Delay of Polymeric Fuels in Low Velocity Flows" *39th Aerospace Sciences Meeting & Exhibit*, AIAA publication 2001-0471, 2001 (with Y.Y. Zhou, D. C. Walther, J.L. Torero, and H. D. Ross).

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"Design and Experimental Results of Small-Scale Rotary Engines" *Proc. 2001 International Mechanical Engineering Congress and Exposition (IMECE),* ASME publication IMECE/MEMS-23924, 2001 (with K. Fu, A.J. Knobloch, F. C. Martinez, D. C. Walther, A. P. Pisano, D. Liepmann, K. Maruta and K. Miyasaka)

"Design and Fabrication of a Silicon-Based MEMS Rotary Engine" Proc. 2001 International Mechanical Engineering Congress and Exposition, (IMECE*), ASME publication IMECE/MEMS-23925, 2001 (with K. Fu, A.J. Knobloch, F. C. Martinez, D. C. Walther, A. P. Pisano, and D. Liepmann, K.)*

"Forced Ignition and Spread Tests" *International Space Station Utilization Conference*, Cape Canaveral, Fla., Oct 15-18, 2001, AIAA 2001-5080 publication, 2001 (with J.L. Torero, and H. Ross)

"Microgravity Smoldering Combustion Experiments in the Space Shuttle" *International Astronautical Federation, 52nd International Astronautical Congress,* Toulouse, France, Oct.1-5, AIAA publication IAF-01-J.3.01, 2001(with A. Bar-Ilan, A. Anthenien, D.C. Walther and D. Urban)

"Effect of Fiberglass Concentration on the Piloted Ignition Delay of Polypropylene Fiberglass Composites" *Combustion Science and Technology*, **174**, 169-185, 2002 (with Stevanovic, A., Mehta, S., Zhou, Y.Y., and Walther, D.).

"Numerical Analysis of Piloted Ignition of Polymeric Materials" *Combustion and Flame,* **131**, 147-158, 2002 (with Zhou, Y.Y. and Walther, D.)

Exhibit B

"Micro-Scale Power Generation Using Combustion: Issues and Approaches" *Proceedings of the Combustion Institute*, Vol. 29, 883-899, 2002 (Topical Review contribution)

"Theoretical Prediction of Ignition Delay of Polymeric Fuels in Microgravity at Low Velocity Flows" *Microgravity Science and Technology,* Vol. XIV/1, 44-50, 2003 (with Zhou, Y.Y., Walther, D.C., Torero, J.L., and Ross, H.).

"Microgravity Forward Smolder Experiments in the Space Shuttle" 41st Aerospace Science Meeting and Exhibit, Reno, NV, January 2003, AIAA publication 2003-0987, 2003 (with Bar-Ilan, A., Rein, G., Torero, J.L., and Urban, D.L.)

"Micro-Scale Combustion: Issues, Applications and Progress" *Proceedings of the Third Mediterranean Combustion Symposium*, Marrakech, Morocco, June 8-13, 2003, C6.1-C6.6, (Plenary Lecture contribution)

"Effect of Buoyancy on Forced Forward Smoldering" *Proceedings of the Third Mediterranean Combustion Symposium*, Marrakech, Morocco, June 8-13, 2003, 770-782 (with Bar-Ilan, A., Rein, G., Torero, J.L., and Urban, D.L.)

"Micro, Internal-Combustion Engine Fabrication with 900 micron Deep Features via DRIE", IMECE2003-42558, *Proc. 2003 International Mechanical Engineering Congress and Exposition (IMECE*), Washington, D.C., November 15-21, 2003 (with Knobloch, A.J., Matt Wasilik, M.and Pisano, A.P.)

"Modeling Flame Spread as a Flame Induced Solid Ignition Process" *Proceedings of the 4th International Seminar on Fire and Explosion Hazards*. University Press, Northern Ireland, U.K., D. Bradley et al. Editors, pp. 13-26, 2004 (Plenary Lecture contribution)

"A Methodology to determine Pre-crash Fuel quantity from Post-crash Fire Thermal Damage to Aircraft Structure*" Proceedings of the 4th International Seminar on Fire and Explosion Hazards,* University Press, Northern Ireland, U.K., D. Bradley et al. Editors, pp. 847-856, 2004 (with Alvares N.)

"Forced Forward Smoldering Experiments in Microgravity" *J. Experimental Thermal and Fluids Science***, 28**, 743-751, 2004 (with Bar-Ilan, A., Rein, G., Torero, J.L., and Urban, D.L)

"Estimating the Performance of Enclosure Fire Models by Correlating Forensic Evidence of Accidental Fires" *INTERFLAM 2004*, Interscience, West Yard House, London, UK, pp. 1183-1194, 2004 (with Rein, G, Bar-Ilan A., and Alvares, N.)

"The Effect of Buoyancy on Opposed Smoldering*" Combustion Science and Technology,* **176***,* 2027-2055*,* 2004 (with Bar-Ilan, A. Rein, G., Walther. D. Torero, J.L., and Urban, D.L.)

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"Transition from Forward Smoldering to Flaming in Small Polyurethane Foam Samples," *Proceedings of the Combustion Institute*, Vol. **30**, 2295-2302, 2004 (with Bar-Ilan, A, Putzeys, O., Rein, G., and Urban, D.L.).

"Fire Modeling: Development and Applications" Proceedings of the Conference on *Computational Simulation Models in Fire Engineering and Research*, pp. 1-6, GIDAI, Santander, Spain, October, 2004 (with Rein, G. Plenary Lecture contribution)

"Comparison of Three Fire Models in the Simulation of Accidental Fires" Proceedings of the Conference on *Computational Simulation Models in Fire Engineering and Research* , pp. 213-234, GIDAI, Santander, Spain, October, 2004 (with Rein, G., Bar-Ilan, A. and Alvares, N.)

"Effect of Chamber Width on Flame Characteristics in Small Combustion Chambers" 43nd AIAA Aerospace Science Meeting and Exhibit, Reno, NV, January 2005, publication AIAA-2005-0943 (with Tsuji, Y., Sprague, B. Walther, D., and Pisano, A.)

"Observations of Forward Smoldering and the Transition to Flaming in Small Polyurethane Foam Samples with Ultrasound Probing". 43nd AIAA Aerospace Science Meeting and Exhibit, Reno, NV, January 2005, publication AIAA-2005-0715 (with Putzeys, O., Titus, R., Bar-Ilan A., and Urban, D.).

"Transition from Smoldering to Flaming" 43rd Aerospace Science Meeting and Exhibit, Reno, NV, January 2005, AIAA publication 2005-0716, 2005 (with Putzeys, O, Bar-Ilan, A., Rein, G., and Urban, D.L.).

"Numerical Modeling of Convective Effects on the Piloted Ignition of Composite Materials," *Combustion Science and Technology*, **177**, No. 5-6, 1231-1252, 2005 (with Lautenberger, C and Zhou, Y.Y.).

"On the Derivation of Polyurethane Foam Kinetics Using Genetic Algorithms and its Application to Smoldering Combustion" *4th International Conference on Computational Heat and Mass Transfer*, R. Bennacer Editor, pp. 578-584, 2005 (with Rein, G., Lautenberger, C, Torero, J., and Urban, D.).

"Approximate Analytical Solutions for the Transient Mass Loss Rate and Piloted Ignition Time of a Radiatively Heated Solid in the High Heat Flux Limit" *Fire Safety Science – Proceedings of the Eighth International Symposium*, pp. 445-456, 2005 (with Lautenberger, C.).

"The Use of Hydrogen Combustion for Power Generation" 3rd International Energy Conversion Conference (IECEC), San Francisco, CA 15-18 August, 2005, AIAA publication 2005-5753, (with Walther, D.C., Dibble, R., Aceves, S.M. and Flowers, D.).

"Characterization of Fuel Flexibility in a 4.97 cm^3 Rotary Engine" *Proceedings of the Fourth Mediterranean Combustion Symposium*, (in press) (with Cardes, A., McCoy, C., Inaoka, L., Walther, D.C., and Pisano, A. P.) 2005.

"Effect of Environmental Variables on Critical Pyrolysate Mass Flux for Piloted Ignition of PMMA and PP/GL Composite" *Proceedings of the Fourth Mediterranean Combustion Symposium*, (in press) (with Lautenberger, C., and Rich, D.) 2005.

"Sooting Behaviour Dynamics of a Non-Buoyant Laminar Diffusion Flame" *Proceedings of the Fourth Mediterranean Combustion Symposium*, (in press) (with Fuentes, A., Legros, G., Rouvreau, S., Joulain, P., Vantelon, J.P., and Torero, J.L.) 2005.

Exhibit B

"The Effects of Environmental Parameters on Smoldering Propagation in Polyurethane Foam Samples," 44th AIAA Aerospace Science Meeting and Exhibit, Reno, NV, January 2006, publication AIAA-2006-742 (with Titus, R., Putzeys, O., Bar-Ilan, A., and Urban, D.).

"Development of Liquid Fuel Injection System for Small Scale Rotary Engines," 44th AIAA Aerospace Science Meeting and Exhibit, Reno, NV, January 2006, publication AIAA-2006-1345 (with Park, S.-W., Walther, D.C., and Pisano, A.).

"Smoldering and Piloted Ignition to Flaming in Polyurethane Foam," 44th AIAA Aerospace Science Meeting and Exhibit, Reno, NV, January 2006, publication AIAA-2006-1131 (with Putzeys, O., Rein, G., and Urban, D.).

"On the Trajectories of Embers Initially Elevated or Lofted by Ground Fire Plumes in High Winds," *Fire Safety Journal,* **41:**5**,** pp. 349-363, 2006 (with Anthenien, R, and Tse S.)

"The Application of a Genetic Algorithm to Estimate Material Properties for Fire Modeling from Bench-Scale Fire Test Data." *Fire Safety Journal*, **41:**3, pp. 204-214, 2006 (with Lautenberger, C., and Rein, G.).

"Application of Genetic Algorithms and Thermogravimetry to Determine the Kinetics of Polyurethane Foam in Smoldering Combustion," *Combustion and Flame*, **146,** pp. 95-108, 2006 (with Rein, G., Lautenberger, C., Torero, J.L., and Urban, D.L.).

"A Comparison of Three Fire Models in the Simulation of Accidental Fires" *Journal of Fire Protection Engineering*, **16**, pp. 183-209, 2006 (with Rein, G. Bar-Ilan, A. And Alvares, N.)

"Ignition of Combustion Modified Polyurethane Foam*," Journal of ASTM International, **3**:3,* paper ID JAI13558, 2006 (with Putzeys, O., and Urban, D.L.).

"Mass Flux of Combustible Solids at Piloted Ignition," *Proceedings of the Combustion Institute*, **31**, pp. 2653-2660, 2007 (with Rich, D., Lautenberger, C., Torero, J.L., and Quintiere, J.G.).

"The Role of Secondary Char Oxidation in the Transition from Smoldering to Flaming" *Proceedings of the Combustion Institute*, **31**, 2669-2676, 2007 (with Putzeys, O., Bar-Ilan, A., Rein, G., and Urban, D.).

"Computational Analysis of forward and Opposed Smoldering Combustion in Microgravity", *Proceedings of the Combustion Institute*, **31**, 2677-2684, 2007 (with Rein, G., and Urban, D.L.).

"Effect of Environmental Variables on Flame Spread Rates in Microgravity" 45th AIAA Aerospace Science Meeting and Exhibit, Reno, NV, publication AIAA-2007-0383, 2007 (with Lautenberger, C., McAllister, S., and Rich. D.).

"Modeling Microgravity and Normal Gravity Opposed Flame Spread Rates Over Polymer and Polymer/Glass Composites" 45th AIAA Aerospace Science Meeting and Exhibit, Reno, NV, AIAA publication AIAA-2007-0740, 2007 (with McAllister, S., Rich, D., Lautenberger, C., and Zhou, Z.G.).

"Development and Characterization of Small-Scale Rotary Engines" *International Journal of Alternate Propulsion, Innovative Combustion Technologies*, 1, Issue 2/3, 275-293, 2007 (with Sprague, S.B., Park, S.-W., Walther, D.C., and Pisano, A.P.).

"Modeling Transport and Combustion of Firebrands from Burning Trees" *Combustion and Flame*, **150**, 151-169, 2007 (with Sardoy, N., Consalvi, J-L., Poterie, B., and Loraud, J.-C.).

"The Effect of Pressure on Piloted Ignition Delay of PMMA" 46th AIAA Aerospace Science Meeting and Exhibit, Reno, NV, AIAA publication , Jan. 2008 (with McAllister, S., Lai, J., Scott, S., Ramirez-Correa, A., Urban, D., and Ruff, G.).

"The Piloted Transition to Flaming in Smoldering of Fire Retarded and Non-Retarded Polyurethane Foam" *Fire and Materials*, **32**, 485-499, 2008 (with Putzeys, O., and Urban, D.).

"Ground-level Distribution of Firebrands Generated by Line Fires" *Combustion and Flame*, **154**, 3, 478-488, 2008 (with Sardoy, N., Consalvi, J-L., Kais, J-L., and Poterie, B.).

"Modeling Ignition of Combustible Fuel Beds by Embers and Heated Particles," *Forest Fires 2008*, 2008 (with Lautenberger, C).

"The Role of Decomposition Kinetics in Pyrolysis Modeling-Application to a Fire Retardant Polyester Composite" *Fire Safety Science*, **9**, 1201-1212, 2008 (with Lautenberbger, C., Kim, E.,and Dembsey, N.).

"Numerical Examination of Two-Dimensional Smolder Structure in Polyurethane Foam" *Proceedings of the Combustion Institute*, **32**, 2, 2497-2504, 2009 (with Dodd, A.B., and Lautenberger, C.).

"Piloted Ignition Delay of PMMA in Space Exploration Atmospheres" *Proceedings of the Combustion Institute*, ***32,*** 2, 2453-2459, 2009 (with McAllister, S., Urban, D., and Ruff, G.).

"Numerical Study of Water Mist Mitigation of Tunnel Fires," *Fire Safety Journal*, **44**, 2, 198-211, Feb. 2009 (with Nmira, F., Consalvi, J.L., Kaiss, A., and Porterie, B.).

"A Generalized Pyrolysis Model for Combustible Solids," *Fire Safety Journal*, **44**, 6, 819-839, Aug. 2009 (with Lautenberger, C.).

"A Model for the Oxidative Pyrolysis of Wood," *Combustion and Flame*, **156**, 8, 1503-1513, Aug. 2009 (with Lautenberger, C.).

Book Chapters

Microgravity Combustion, H.D. Ross, Editor, Academic Press. Chapter 5, "Mechanisms of Flame Spread and Smolder Wave Propagation" pp.299-367, 2001 (with T'ien, J.S., Shih, H.J., Jiang, C.B., Ross, H.D., Miller, F.J., Torero, J.L. and Walther, D.C.)

Flammability Testing of Materials in Building, Construction, Transport and Mining Sectors, V. Apte, Editor, Woodhead Publishing Ltd. Chapter 1. "Understanding Materials Flammability" pp. 1-21, 2006 (with Lautenberger C, and Torero, J.L.).

Lautenberger, C. & Fernandez-Pello, A.C., "Pyrolysis Modeling, Thermal Decomposition, and Transport Processes in Combustible Solids," in *Transport Phenomena in Fires*, Edited by M. Faghri and B. Sunden, WIT Press, pp. 209-248, 2008.

Exhibit B

Name: Scott L. Stephens
Title: Associate Professor of Fire Science

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Education

Ph.D. Wildland Resource Science, *University of California, Berkeley,* 1995.
Graduate study, Departments of Land, Air and Water Resources and Biological and Agricultural Engineering, *University of California, Davis,* 1988-1991. (hydrology, soil science, plant sciences)
M.S. Bio-Engineering, *California State University, Sacramento*, 1988.
B.S. Electrical Engineering, *California State University, Sacramento*, 1985.

Positions held

Associate Professor of Fire Science, University of California, Berkeley. 2006 - present.
Assistant Professor of Fire Science, University of California, Berkeley. 2000 – 2006.
Assistant Professor of Quantitative Plant Ecology, California Polytechnic State University, San Luis Obispo. 1997-2000
Research Forester, US Forest Service Pacific Southwest Research Station, Albany, CA. 1995-1997

Teaching awards

Received the Department of Environmental Science, Policy, and Management Award for Undergraduate Teaching Excellence in May, 2005.

Invited Congressional Testimony

Testimony before the US House of Representatives subcommittee on Forest and Forest Health and subcommittee on National Parks and Public Lands concerning the escaped prescribed fire at Los Alamos, New Mexico. (6/7/00)

Testimony before the US House of Representatives subcommittee on Forest and Forest Health on Recovering from the fires: restoring and protecting communities, water, wildlife, and forests in Southern California. (12/5/2003)

Testimony before the US House of Representatives Resources committee on the Sierra Nevada forest plan: protecting communities, water, wildlife, and forests in the Sierra Nevada. (2/28/04)

Research Funding Summary

The majority of my research funding (71 percent) has been obtained from the USDA-USDI Joint Fire Sciences Program, a highly competitive research organization. This program publishes a call for proposals once a year.
Grants with Stephens as PI since 2000: $ 4,376,900

Professional Society Membership

Association for Fire Ecology – Vice President 2003, President 2009
International Association of Wildland Fire
California Botanical Society

Associate Editor Positions

Canadian Journal of Forest Research 2003-2007
Fire Ecology (one of the founding editors) 2004-present

Exhibit B

Western Journal of Applied Forestry 2002-2003

International Presentations and Appointments

I have been asked to be a keynote speaker at fire conferences in Spain, Brazil, Mexico, and Australia. I am a member of the International Science Review Committee for the Bushfire CRC project in Australia and the Fire Paradox project in the European Union.

Selected Publications since 2005

Stephens, S.L., J.J. Moghaddas, C. Ediminster, C.E. Fiedler, S. Hasse, M.Harrington, J.E. Keeley, J.D. McIver, K. Metlen, C.N. Skinner, and A.Youngblood. 2009. Fire treatment effects on vegetation structure, fuels, and potential fire severity in western U.S. forests. Ecol. Apps 19: 305-320.

Stephens S. L., M. Adams, J. Hadmer. F. Kearns, B. Leicester, J. Leonard, M. Moritz. 2009. Urban-wildland fires: how California and other regions of the US can learn from Australia Environmental Research Letters 4 014010

Stephens S.L, Fry D, Franco-Vizcano E. 2008. Wildfire and forests in Northwestern Mexico: the United States wishes it had similar fire 'problems'. Ecology and Society. 13(2): 10

Hartsough, B.R., S. Abrams, R.J. Barbour, E.S. Drews, J.D. McIver, J.J. Moghaddas, D.W. Schwilk, and S.L. Stephens. 2008. The economics of alternative fuel reduction treatments in western United States dry forests: financial and policy implications from the National Fire and Fire Surrogate Study. Forest Economics and Policy. 10:344-354.

Stephens, S.L., R.E. Martin, and N. Clinton. 2007. Prehistoric fire area and emissions from California's forests, woodlands, shrublands, and grasslands. Forest Ecology and Management 251:205-216.

Millar, C.I., N.L. Stephenson, and S.L. Stephens. 2007. Climate change and forests of the future: managing in the face of uncertainty. Ecological Applications 17: 2145-2151.

Stephens, S.L., and N.G. Sugihara. 2006. Fire management and policy since European settlement. In: Fire in California Ecosystems, University of California Press. Berkeley, CA. pp. 431-434.

Collins, B.M. and S.L. Stephens. 2007. Managing Natural Fires in Sierra Nevada Wilderness Areas. Frontiers in Ecology and the Environment 5: 523-527.

Kobziar, L., and Stephens, S.L. 2006. The effects of fuels treatments on soil carbon respiration in a Sierra Nevada pine plantation. Agricultural and Forest Meteorology 141: 161-178.

Apigian, K., D. Dahlsten, and S.L. Stephens. 2006. Fire and fire surrogate treatment effects on leaf litter arthropods in a western Sierra Nevada mixed-conifer forest. For. Ecol. Man. 221:110-122.

Stephens, S.L., and P.Z. Fule. 2005. Western pine forests with continuing frequent fire regimes: Possible reference sites for management. Journal of Forestry 103: 357-362.

Stephens, S.L., and D. R. Fry. 2005. Spatial distribution of regeneration patches in an old-growth Pinus jeffreyi-mixed conifer forest in northwestern Mexico. Journal of Vegetation Science 16:693-702.

Beche, L.A., S.L. Stephens, and V.H. Resh. 2005. Prescribed fire effects on a riparian and stream community in the Sierra Nevada: Dark Canyon Creek, California. For. Ecol. Man 218:37-59.

Stephens, S.L. and J.J Moghaddas. 2005. Silvicultural and reserve impacts on potential fire behavior and forest conservation: 25 years of experience from Sierra Nevada mixed conifer forests. Biological Conservation 25:369-379.

Stephens, S.L. and J.J. Moghaddas. 2005. Experimental fuel treatment impacts on forest structure, potential fire behavior, and predicted tree mortality in a mixed conifer forest. For. Ecol. Man. 215:21-36.

Stephens, S.L. 2005. Forest fire causes and extent on United States Forest Service lands. International Journal of Wildland Fire 14: 213-222.

Stephens, S.L. and Ruth, L.W. 2005. Federal forest fire policy in the United States. Ecological Applications 15:532-542.

Exhibit B

Dr. Marc G. Kramer

Education and Experience

2001 -PhD. Oregon State University. Forest Ecology; 1997 -M.S. Montana State University. Biology (Ecology); 1993 -B.A. University of California, Berkeley. Environmental Science.

2005-	Research Scientist –Rank: Level IV Assistant, UC Santa Cruz, Earth and Planetary Sciences Department.
2002-	Adjunct Assistant Professor, Earth Systems Science & Policy Institute Cal State Monterey Bay.
2003-2007	Senior Research Scientist. NASA Ames Research Center.
2007	Visiting Assistant Professor. Mills College, Department of Biology.
2006	Lecturer. San Francisco State Department of Geography.
2003-2005	Senior Research Scientist, Earth Systems Science & Policy Institute Cal State Monterey Bay.
2001-2003	NRC American Academy of Sciences Postdoctoral Research Fellow at NASA Ames.
1997-2000	Graduate Research Assistant. Oregon State University, Corvallis, OR (school year).
1997-2000	GS-9,GS-11 Forest Ecologist. USDA Forest Service, Pacific Northwest Research Station. Corvallis, OR (summer months).

Past Accomplishments:

Marc Kramer is Research Scientist in the Earth and Planetary Sciences Department of the University of California, Santa Cruz. For the last 10 years, he has studied the interactions between climate, the biosphere and the pedosphere. His work is focused on two primary themes: the influence of climate on soil carbon dynamics and ecological effects of winds on the Earth's surface. Currently, Kramer is a PI on three major research grants funded through NASA and the USDA and Co PI on two other research grants related to interactions between the atmosphere and biosphere. Kramer's research program emphasizes the integration of climate models and observations with environmental data across multiple spatial and temporal scales and relies on a combination of computationally intensive climate models, remote sensing, fieldwork and a range of laboratory analytic techniques. Through these efforts he seeks to develop an integrated understanding of climate impacts on ecosystem structure and function from the pedon up to the landscape and global ecosystem scale. Examples of currently funded research activities include: 1) The influence of climatic and pedogenic thresholds on soil carbon dynamics and soil water movement across a time-climate gradient in Hawaii 2) Long-term edaphic and forest impacts of extratropical cyclonic windstorm activity on temperate rainforest biomes of the northern and southern hemispheres 3) The use of Light Detection and Ranging (LiDAR) remote sensing to understand forest disturbance and surface redistribution processes (erosion, deposition, and soil water movement) 4) The use of carbon and nitrogen stable isotopes and nuclear magnetic resonance (NMR) to understand how microbial-driven nitrogen transformations influence the accumulation of carbon on mineral soil particles. For the last three years Kramer has been funded as a PI funded through NASA's Applications grants program to work with USDA ARS and NASA scientists and in close collaboration with Dr. Carruthers to develop a spatially explicit predictive modeling framework to simulate invasive species growth/ development and natural enemy impact. Over the past 9 years (since completing his PhD in 2001), Kramer has published 23 scientific articles, 16 of which were published in peer review journals.

Exhibit B

Relevant Publications:

1. Phillip Sollins, Marc G. Kramer, Christopher Swanston, Kate Lajtha, Timothy Filley, Sequential Density Fractionation across Soils of Contrasting Mineralogy: Evidence for both Microbial-and Mineral-Controlled Soil Organic Matter Stabilization. Biogeochemistry, 2009. 96:209–231.

2. Kao, David M.G. Kramer A. Love J. Dungan and A. Pang. 2005. Visualizing distributions from multi-return lidar data to understand forest structure. Special issue on Geovisualization with The Cartographic Journal. 41(1): 1-14.
3. DeGayner, Eugene, M.G. Kramer, J. G. Doerr, M. J. Robertsen. 2005. Windstorm disturbance effects on forest structure and black bear dens southeast Alaska. Ecological Applications. 15(4):1306-1316.

4. Kramer, Marc G. 2007. Contributing author on. "Recommendations for Research on Extreme Weather Impacts on Infrastructure." UCAR http://www.rap.ucar.edu/~bwb/weather-impacts/

5. Kramer, Marc G., A.J. Hansen, M. Taper, and E. Kissinger. 2001. Abiotic controls on windthrow and forest dynamics in a coastal temperate rainforest, Kuiu Island, southeast Alaska. Ecology. 82(10): 2749-2768.

CERTIFICATE OF SERVICE

I hereby certify that: I am over the age of eighteen years and not a party to the within entitled action; my business address is 112 Lakeview Canyon Road, CA501LB, Thousand Oaks, California 91362; I have this day served a copy of the foregoing, **OPENING BRIEF OF THE CIP COALITION** by electronic mail to those who have provided an e-mail address and by U.S. Mail to those who have not, on the service list.

I declare under penalty of perjury that the foregoing is true and correct. Executed this 3rd day of September, 2010 at Thousand Oaks, California.

/s/ Jacque Lopez
JACQUE LOPEZ

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