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LIABILITY OF PRIVATE BUSINESSES AND INDUSTRIES FOR EARTHQUAKE HAZARDS AND LOSSES

Background Research Reports

September 1984

REPRODUCED BY
NATIONAL TECHNICAL
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U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

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AND INDUSTRIES
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SEPTEMBER 1984

ASSOCIATION OF BAY AREA GOVERNMENTS

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CREDITS

PROJECT PARTICIPANTS

JEANNE PERKINS - Project Manager; ABAG Earthquake Program Manager
KENNETH MOY - ABAG Legal Counsel
DOUG DETLING, RICHARD EGGERTH, MARCI LOSS

With Technical Assistance From:

PROF. GARY SCHWARTZ - (UCLA School of Law) - Legal research
DON SOLEM AND ASSOCIATES - Survey research
PAT YOSHITSU - Cover design

ABAG Management

REVAN A. F. TRANTER - Executive Director
EUGENE Y. LEONG - Deputy Executive Director

Project Review Committee

ROD DIRIDON (Chairman) - Santa Clara County Supervisor
STANLEY SCOTT (Vice-Chair) - Member and former Chair; California Seismic Safety Commission
ROBERT D. BROWN - Geologist; U.S. Geological Survey
HENRY J. DEGENKOLB - President; H.J. Degenkolb Associates, Engineers
PETER B. HAWES, EDWIN ROOKER - President, Claims Counsel; Design Professionals Insurance Corporation
JOHN H. LARSON - Former Los Angeles County Counsel; Musick, Peeler, and Garrett
BRUCE D. OLIVER - Assistant General Counsel; Kaiser Aluminum and Chemical Corporation
H. ROGER PULLEY - Senior Planner; California Office of Emergency Services
ARVO VAN ALSTYNE - Professor of Law; University of Utah
CHARLES T. VAN DEUSEN, JAMES C. LOGSDON - Attorneys; Pacific Gas and Electric Company

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BACKGROUND

In 1982-1984, under a grant from the National Science Foundation, the Association of Bay Area Governments (ABAG) studied the potential liability of the private sector for injuries and damage resulting from an earthquake. The final report from that project is: Liability of Private Businesses and Industries for Earthquake Hazards and Losses -- A Guide to the Law, Its Impacts and Safety Implications (the Guide).

The Guide summarizes and integrates the five background research reports reproduced in this document. No attempt has been made to edit these reports into a single format. They are merely being made available for those who may wish to examine all of the data gathered in the research effort. Those wishing an integrated report should examine the Guide.

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PRIVATE SECTOR TORT LIABILITY, SAFETY INCENTIVES
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BACKGROUND RESEARCH REPORT 1

PRIVATE-SECTOR TORT LIABILITY, SAFETY INCENTIVES AND EARTHQUAKES--

Results of an Investigation on the Role of
Liability as a Stimulus for Earthquake Hazard Mitigation

July 1983

Association of Bay Area Governments

CREDITS

Legal Research:

Gary Schwartz, Professor of Law; University
of California, Los Angeles

Staff:

Richard Eggerth, ABAG Associate Legal Counsel;
Benner, Harris and Moy
Kenneth Moy, ABAG Legal Counsel; Benner Harris
and Moy

Project Review Committee:

Rod Diridon (Chairman) - Santa Clara County Supervisor
Stanley Scott (Vice Chairman) - California State Seismic
Safety Commission

Robert D. Brown - Geologist, U.S. Geological Survey
Henry J. Degenkolb - H.J. Degenkolb Associates, Engineers
Peter B. Hawes - Design Professionals Insurance Corporation
John H. Larson - former Los Angeles County Counsel
Bruce D. Oliver - Kaiser Aluminum and Chemical Corporation
H. Roger Pulley - California Office of Emergency Services
Arvo Van Alstyne - State of Utah Commissioner of Education
Charles T. Van Deusen - Pacific Gas and Electric Company

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INTRODUCTION AND SUMMARY

The subject of this report is how rules of "tort"--of civil liability for accidents--may affect the behavior of people who are in a position to prevent accidents. Part I of this Report describes the two major liability rules--"negligence liability" and "strict liability"--that presently apply to conduct in the private sector. The discussion in Part I relates generally to jurisdictions within the United States. (Technically, the court system of each state is independent; in fact, the judicial law of the fifty states tends to harmonize.) One of the major points of Part I is that negligence is the "general" liability standard. Negligence can be defined in two ways. Under one definition, negligent conduct is that which the "reasonable person" would abstain from; under the other definition, negligence is conduct the risks in which exceed the costs of reducing or preventing those risks. While negligence may be the "general" liability standard, there are a number of strict liability "exceptions," exceptions which range from the trivial to the tremendous in their implications. One strict liability rule of enormous importance is the rule that renders employers strictly liable for the negligence of their employees (herein of "vicarious liability"). Another strict liability rule of immense importance is that contained in workers' compensation programs, programs which render the employer liable for all employee injuries occurring "in the course of" and "arising out of" the employment. Other strict liability rules relate to abnormally dangerous activities and the sale of defective products (whether the defect is one of manufacture or design). In addition, a federal statute provides a guarantee of at least limited compensation to all victims of a nuclear power plant accident; the cost of compensation is to be borne (although only to a limited extent) by the individual power plant operator. Part I concludes with a brief discussion of intentional torts and communication torts.

Part II discusses the purposes of liability rules. One traditional purpose of negligence liability is to provide a fair and just result for private disputes. A second purpose has also emerged, however: this is the purpose of encouraging safety in an intelligent way. Part II discusses how negligence liability might succeed in achieving safety. However, that part then lists points which call into question the safety rationale for negligence liability. Some of these points suggest that negligence liability is unnecessary for achieving safety, since parties may refrain from negligent conduct for reasons independent of the negligence liability rule. (Here, the report discusses the prospect of injurer altruism, the existence of economic and contractual incentives in favor of safety, and the role of regulation in providing safety.) In addition, there are other points suggesting that negligence liability may be insufficient or unsuccessful in discouraging negligent conduct. These points concern the inadequate information available to parties and courts; the problems that arise in the valuation of life and limb; the insufficiency of legal damages in the event of death; the "featureless generality" of the common-law negligence standard; the possibility that

injurers may not behave in a rational way; the fact that much of negligent conduct is inadvertent in character; and the extent to which liability insurance reduces incentives operating on parties.

As for strict liability, there is a set of special arguments which suggest why strict liability may have safety benefits that exceed those associated with the negligence rule. The possible safety advantages of strict liability relate to the extent to which it avoids the erratic judgments of juries, the extent to which it bypasses the limited competence of courts in considering highly technical negligence arguments, and the extent to which it provides defendants with long-term incentives to develop new safety programs and technologies. It should be noted, however, that the safety arguments in favor of strict liability are, by and large, subject to the same caveats that relate to negligence liability as a safety measure. Part II concludes with a section that briefly discusses the rather special problem of earthquakes as low-frequency occurrences.

I. WHAT ARE THE LIABILITY RULES?

A. NEGLIGENCE

1. The Development of the Negligence Standard

For many years, in the United States in general (and California in particular) "negligence" has been recognized as the primary standard for liability in tort. There are a number of views as to the process by which the negligence standard achieved this eminence. Some scholars believe that tort law was dominated by a network of strict liability rules throughout the eighteenth century;¹ in the first half of the nineteenth century, then, strict liability was jettisoned by conservative judges in favor of a negligence standard. Other scholars believe that "no liability," rather than strict liability, was the dominant tort law position in the eighteenth and much of the nineteenth century, and that the negligence standard eventually replaced the no liability alternative.² Others believe that tort law did not even meaningfully exist until midway through the nineteenth century. According to their view, tort law and the negligence standard were more-or-less invented simultaneously; "[strict] liability was rejected; more accurately, it was never considered."³

2. The Definition of Negligence

If negligence, by whatever process, now is recognized as the dominant liability criterion, what, then, is the definition of the negligence standard? Many judicial opinions characterize negligence in an intuitive or common sense way. Thus negligence is behavior that falls below the standard of "ordinary care" or "reasonable care"; it is behavior that would be avoided by the "reasonable person" (previously referred to as the "reasonable man").

The second approach to defining negligence calls for balancing the risk created by the defendant's conduct against the cost the defendant would need to incur in eliminating (or reducing) that risk. This view

of negligence can indeed be traced back to nineteenth-century case law. The view suggests that the more foreseeable the risk of harm--and the more serious the harm which is foreseeable--the more burdensome the precautions that negligence law obliges the defendant to take. The cases verify these suggestions. In an 1856 English case,⁴ an extraordinary frost caused the defendant's water main to burst, resulting in damage to the plaintiff's nearby house. The court, focussing on unforeseeability, ruled that the defendant had not been negligent, noting that the frost had been of "extreme severity" and had "penetrated to a greater depth than any which ordinarily occurs south of the polar regions."⁵ As for the factor of severity, consider an 1893 California opinion.⁵ The plaintiff was injured when the elevator in the defendant's store for some reason fell. The California Supreme Court, in elaborating on the negligence standard, noted that "when persons are injured by the giving way of the [elevator] machinery the hurt is always serious, frequently fatal. . . . The law, therefore, throws around such persons its protection, by requiring the highest care and vigilance."

While the scholarly literature talks at length about "ordinary care" and the "reasonable man," it also supports a balancing approach. Writing in the Harvard Law Review back in 1915, Professor Terry advanced a view of negligence that takes into account five factors;⁶ it is easy to interpret these factors as urging a balancing of the character of the risk against the disadvantages of risk prevention. The Restatement of Torts, issued in 1934, likewise endorsed a balancing process--although one that it described in rather "mushy" terms. (The Restatement is issued by the American Law Institute--the "Establishment" of the legal profession--in an effort to clarify and codify the common law.) It fell to Judge Learned Hand--one of the most famous of all American jurists--to give the negligence test a more precise formulation. In United States v. Carroll Towing Co.,⁸ Hand indicated that negligence

is a function of three variables: (1) the probability that [an accident will occur]; (2) the gravity of the resulting injury--if [an accident does occur]; (3) the burden of adequate precautions. Possibly it serves to bring this notion into relief to state it in algebraic terms: if the probability be called P; the injury, L; and the burden B; liability depends on whether B is less than L multiplied by P: i.e., whether $B < PL$.

The Hand formula can be rendered more consistent with professional language by allowing "S" (for Severity) to replace the non-descript "L". Moreover, for purposes of discussion, the product of P (Probability) and S (Severity) can perhaps be referred to in a rather unitary way as the "magnitude of the risk."

As it happens, Judge Hand's Carroll Towing opinion has been very rarely cited by later cases. The formula for negligence that Hand developed, however, has been accepted by Professor William Prosser and presented prominently by him beginning in 1955 in his enormously influential tort treatise or "hornbook."⁹ It was likewise approved of

by the American Law Institute, and accordingly included in the Second Restatement of Torts, published by the American Law Institute in 1965.¹⁰ (The mushiness, however, remains.) With the help of intermediaries like Prosser and the Second Restatement, the basic idea behind the Hand formula has eventually been incorporated into hundreds of tort judicial opinions.

In California, a recent--though already famous--application of the negligence standard can be found in Weirum v. RKO General, Inc.¹¹ Here a Los Angeles radio station engaged in a promotional activity pursuant to which a prize was given to the first listener who approached a car that was being driven through Los Angeles by a local disc jockey; hints as to the disc jockey's location were periodically provided on the station's broadcasts. A teenager, hearing one such hint, sped down the Ventura Freeway in an effort to reach the disc jockey; losing control of his car, he injured the plaintiff--who sued not the teenage driver (who probably lacked insurance) but rather the radio station. The California Supreme Court, though acknowledging that the promotional activity had not produced any prior incidents, nevertheless thought it "foreseeable" that youthful listeners "would race to arrive first at the next site and in their haste would disregard the demands of highway safety." The Court continued:

It is true, of course, that virtually every act involves some conceivable danger. Liability is imposed only if the risk of harm resulting from the act is deemed unreasonable--i.e., if the gravity and likelihood of the danger outweigh the utility of the conduct involved.

We need not belabor the grave danger inherent in the contest broadcast by defendant. The risk of a high speed automobile chase is the risk of death or serious injury. Obviously, neither the entertainment afforded by the contest nor its commercial rewards can justify the creation of such a grave risk. Defendant could have accomplished its objectives of entertaining its listeners and increasing advertising revenues by adopting a contest format which would have avoided danger to the motoring public.¹²

Weirum stands as a dramatic illustration of the negligent standard in strong operation as the final quarter of the twentieth century begins.

Application: Under Weirum, for example, the liability of a landowner whose building collapses during an earthquake would apparently be determined by weighing the costs of making the building more earthquake resistant against the earthquake safety benefits that such resistance would have provided. (It is assumed here that there is no "act of God" doctrine that limits negligence liability.) Alternatively, the negligence test might be expressed in terms of what a "reasonable person" owning the building would have been willing to do in light of the earthquake contingency. Under either formulation, negligence law would be primarily concerned with "foreseeable" risks; it is this concern for foreseeability that to some extent distinguishes the negligence standard from strict liability. The Weirum opinion frequently emphasizes the

"foreseeability" test, and distinguishes it from a "hindsight" approach. In considering the facts in Weirum, the Court insisted that a "foreseeable risk" existed even though the promotional activity itself had never previously led to an accident. This perhaps verifies that the level of foreseeability required by negligence law is not particularly high. While judges frequently employ the phrase "reasonably foreseeable," the notion of "distinctively foreseeable" or even "minimally foreseeable" might be a more accurate expression. One California judge, commenting off-the-bench about Weirum, has ventured the thought that "on a clear judicial day you can foresee forever."

The foregoing discussion has emphasized the negligence standard of liability. However, in a lawsuit that involves application of that standard, a number of additional issues might well arise that would be relevant to the victim's right to recovery even if the defendant has been negligent. For example, it must be determined whether the negligence was the "cause-in-fact" and the "proximate cause" of the plaintiff's injury. In some cases, moreover, there may be uncertainty as to whether the particular type of injury which the plaintiff has suffered (for example, emotional distress) is legally compensable. Additionally, there may be a range of "affirmative defenses" that are available even once negligence has been proven. Of particular concern is the possible defense relating to "Act of God." If there is an "Act of God" defense, the negligence law might lead to few liabilities in an earthquake situation. Of course, even if the earthquake itself is perhaps the epitome of an "Act of God," the damages that result from an earthquake may be subject to reduction and control by non-negligent precautions. The question thus is: to what extent is there an "Act of God" doctrine that might relieve the defendant of liability in the event of his failure to adopt these precautions?

The range of issues that might surround a negligence claim (including "Act of God") are dealt with, in particular applications, in a companion report entitled "Tort Liability of Private Businesses and Industries For Earthquake Hazards - Review of Current California Law."

3. Original Liability and Ultimate Liability

Lawsuits of the sort described above determine which parties bear liability in the first instance. For a number of reasons, however, the burden of ultimate liability may differ significantly from the pattern of original liability.

Assume, for example, that a person is injured by the combined negligence of several parties, in circumstances where the accident would not have occurred except for the negligence of each of these parties. Under the traditional rule of "joint and several liability," the plaintiff is able to sue, secure a full judgment, and collect that judgment from any one or more of those defendants. (Of course, the plaintiff is not allowed to end up with more than 100%.) Under traditional law, moreover, any one of those negligent parties--if "stung" by a full judgment--was given only limited opportunities to require a sharing of the loss among the other negligent parties. California law, however, has recently been revised by the California

Supreme Court in American Motorcycle Association v. Superior Court.¹³ American Motorcycle allows any one defendant to bring a "cross-complaint" against any other negligent party. If the plaintiff then chooses to collect in full from "Defendant One," that Defendant can require Defendants "Two," "Three," and "Four" to reimburse Defendant One for each's fair share of the overall liability. It is the responsibility of the jury to compare the negligence of the various defendants and to apportion the ultimate liability among them. (One can mention that there are an almost endless number of additional issues generated by American Motorcycle, including, for example, the treatment of defendants who "settle in good faith." Those issues are not dealt with here.)

There may also be contractual arrangements that result in a shift of liability from the original defendant to some other party. Agreements of "indemnification" are common; in such an agreement, Party B agrees to reimburse Party A for the cost of any legal judgments that may be entered against A. A liability insurance policy is an important example of a contract of this sort; it is, of course, obviously the case that many tort judgments are actually paid by liability insurers rather than by the defendants against whom judgments are originally entered. (The impact of liability insurance is described more fully in Part II.) On some occasions, there may be a contract between the defendant and the plaintiff which professes to either eliminate or limit the defendant's liability to the plaintiff. For example, the standard contract employed by soil and foundation engineers limits their liability to the amount of their fee on any particular project. The extent to which such "disclaimers" of tort liability are legally valid is discussed in the companion report.

B. STRICT LIABILITY

Even though negligence may represent the general liability standard, there are a number of strict liability rules inhabiting late twentieth-century law that should also be acknowledged, rules which, in their individual impact, range from the trivial to the tremendous. (Strict liability means a right to recover for harm caused without proof of any legal fault of negligence.)

1. Cattle trespasses. There is, first of all, a rule of strict liability for the trespass of cattle. That is, the farmer is liable for all his cattle's trespasses even if the owner has exercised all due care to prevent the cattle's escape. This rule is of little significance in contemporary tort law generally. The rule appears to be accepted in California, though to some extent subject to local option.¹⁴ One California court has applied the rule not only to cattle that trespass,¹⁵ but also to bulls that attack, and hence cause personal injury.

Application: If an earthquake knocks over a fence and hence enables cattle to escape, the farmer would be liable for the harm thereby caused, even if the fence was itself fully "reasonable."

2. Dog bites. Additionally, there is a rule of strict liability for bites inflicted by domestic animals that are known by their owner to

be dangerous. This rule is of trivial significance in tort law generally. The rule was adopted in California by the state Supreme Court in the 1870's,¹⁶ but has been very infrequently litigated in the intervening century.

Application: If a dog owner is in no way negligent, but if an earthquake frightens a dog, who then bites a victim, the victim can recover against the non-negligent owner--if the dog is one that is known by the owner to bite.

3. Products liability. A far more dramatic rule is that of "strict products liability," given momentum by the California Supreme Court in a pathbreaking 1962 opinion, Greenman v. Yuba Power Products Company.¹⁷ The products liability rule, however, is not nearly so "strict" as it seems at first. To be sure, the victim is relieved of the obligation of demonstrating the manufacturer's actual negligence. But the victim is required to establish the existence of some "defect" in the manufacturer's product. And a defect in a product is almost always suggestive of some negligence for which the manufacturer can properly be held responsible. To be sure, in the modern world a manufacturing defect may be due to robot failure rather than human failure. But if (under vicarious liability) an employer can properly be held liable for the errors of employees whom it hires and supervises, surely the employer should also be held liable for the errors of machines which it both selects and maintains.

As California judicial opinions recognize,¹⁸ there are three kinds of product defects. A "manufacturing defect" is a flaw in the particular product which differentiates that product from all the other products which the manufacturer sells. Such defects almost always enter the product, however, by some assembly-line employee negligence for which the manufacturer can be held liable under an appropriate vicarious liability rule. Strict liability for "manufacturing defects" thus does not greatly expand on the liability to which the manufacturer would be subject under a negligence standard, though it does usefully simplify the issues in products litigation.

Application: A manufacturing flaw in a prefabricated house (e.g., an incipient crack) might result in personal injury during an earthquake, thereby subjecting the producer of the house to strict liability (at least if prefabricated housing is regarded as a "product.")

A defect in the "design" of a product is primarily determined, under a leading California Supreme Court opinion, by the application of a "risk-benefit standard"--a standard that invites the jury to compare the risk of a particular design feature to the benefits of that design feature, benefits that the manufacturer would be required to forego in adopting an alternative design. (These benefits include improved performance and reduced cost.) This risk-benefit test seems to be a strong restatement of the balancing test which has been the essence of negligence law at least since the Learned Hand opinion in Carroll Towing. Once again, then, products liability, though ostensibly strict, incorporates and carries forward basic negligence notions.

Application: A product that is insufficiently stable to withstand the pressures of an earthquake without falling over might possibly be labelled defective in design; a similar label might apply to the transformer purchased by a power company that becomes nonoperational during an earthquake. Everything would depend on the feasibility of more effective designs.

A third kind of defect is the failure to warn. Most cases, following the Second Restatement, impose an obligation to warn only if the manufacturer knows or has reason to know of the hazard in the product in question.¹⁹ Given this prerequisite, the "strict liability" obligation to warn is almost exactly coextensive with the warning obligation that negligence law would impose on the manufacturer.

Application: Depending on an assessment of the likelihood of an earthquake, a manufacturer might be obliged to give instructions as to how the product should be used or set up in order to minimize the harm that an earthquake might produce; perhaps, for example, manufacturers of bookcases should advise their buyers to attach the bookcase to the wall.

There is one way, however, in which products liability might possibly be distinctively strict. Negligence law, as noted above, is basically concerned with "foreseeable" risks. However, in a leading California judicial opinion there is language suggesting that a "hindsight" perspective should be relied on²⁰ in making risk-benefit assessments in a design defect case. Moreover, a "hindsight" perspective--if appropriate in products liability design defect cases--would seem appropriate in products liability failure-to-warn cases as well. Given the implications of "hindsight," therefore, a manufacturer might well be liable in California for a failure to warn of a product hazard even if that hazard had been "scientifically unknowable" at the time the product was developed and sold. Such a rule of strict liability has recently²¹ been applied to asbestos manufacturers by the New Jersey Supreme Court.

Application: "Hindsight" liabilities could pertain to products that were reasonably believed to be earthquake-safe prior to the earthquake, but which were proven unsafe by the earthquake itself.

4. "Ultrahazardous activities." During the late nineteenth century--and despite the general recognition of the negligence standard--persons engaging in the activity of blasting were rather routinely held liable, in California and elsewhere, without much regard for the niceties of negligence law. Moreover, a famous English opinion, Rylands v. Fletcher,²² adopted a strict liability rule for the harm caused by the water escaping from a reservoir that the defendant had erected on his land. The Rylands rule--regarded as controversial in many American jurisdictions--seems to have been largely ignored in California. In any event, in drafting the First Restatement of Torts, the American rule synthesized both the blasting cases and Rylands,²³ into a general rule of strict liability for "ultrahazardous activities." An ultrahazardous activity is one which "necessarily involves a risk of serious harm to the person, land or [personal property] of another which cannot be eliminated by the exercise of the utmost care, and....is not

a matter of common usage." The Second Restatement, adopted in 1975, has replaced "ultrahazardous" with the phrase "abnormally dangerous activity."²⁴ And the Second Restatement likewise replaces the clear definitions in the First Restatement with a list of "factors" which are to be "considered" in ascertaining whether an activity is abnormally dangerous. Under the Second Restatement, accordingly, the probability of harm, the severity of an accident if one should occur, the possibility of common usage, and the appropriateness of the location of the activity are merely "factors" which the decisionmaker should take into account in determining whether an activity is abnormally dangerous and hence subject to strict liability. At least one post-1975 court, unhappy²⁵ with the Second Restatement, has chosen to remain with the First.

In 1928, the California Supreme Court, in Green v. General Petroleum Corporation,²⁶ imposed strict liability on the owner of an oil well that, because of the pressure of natural gas, "blew out" while being drilled, resulting in damage to the plaintiff's land. In Luthringer v. Moore in 1948,²⁷ the Supreme Court adopted the First Restatement's ultrahazardous standard, and applied it to a defendant who was fumigating the basement of a building with a gas that was both highly penetrating and highly toxic. Perhaps because of its "common usage" caveat, however, the Restatement rule has been largely without significance in the ongoing world of tort litigation. No questions concerning that rule have reached the California Supreme Court in the thirty-four years since its Luthringer opinion. Intervening decisions by the California courts have interpreted the coverage of the rule narrowly; thus, a fireworks display is not an ultrahazardous activity, and the use of firearms is likewise not ultrahazardous.

Application: The storage of hazardous materials that might be released by an earthquake could possibly be regarded as an ultrahazardous activity.

5. Vicarious liability. It now is a fundamental rule of tort law that an employer is strictly liable for the torts of its employees committed by the employees while "within the scope" of their employment. It is often said—for example, by leading scholars like Horwitz and Leonard Levy—that this rule of vicarious liability ("respondeat superior") is of "ancient" origins.²⁸ This suggestion is false. In fact, it was only during the course of the eighteenth century that this rule of vicarious liability seems to have developed in England. In any event, however, by the end of that century it was rather firmly in place in England; and it was immediately accepted by California courts²⁹ after the California court system was created upon statehood in 1850.

The rule of vicarious liability is of such general significance as to impose a major qualification on the idea (expressed above) that negligence rather than strict liability is the general standard of liability in tort. In a typical lawsuit, a plaintiff will in fact be suing an employer. In this suit, the plaintiff will indeed need to establish the negligence of some employee. But the employee's negligence will then be "imputed" to the employer only by virtue of the

strict liability rule of vicarious liability. The plaintiff's claim is thus an indissoluble mix of negligence and strict liability.

Application: In many earthquake cases a plaintiff would be suing a corporation for failures attributable to low-level employees, or to officers at a middle or high rank. Regardless of rank, vicarious liability applies.

Of course, even if strict liability were repealed, an employer could still be held liable for the harm resulting from the negligence of its employee upon a showing by the plaintiff that the employer had itself been negligent in any number of ways--negligent, for example, in selecting the offending employee, negligent in training that employee, negligent in supervising him, or negligent in retaining him in the workplace after learning of his negligent propensities. The key to vicarious liability is that it allows the plaintiff to recover against the employer automatically, without needing to establish any employer negligence of the sorts just described.

6. Workers' compensation. A somewhat different rule of strict liability also involves the employment relationship. Under the common law of torts, the employee could recover against the employer for an employee injury only by establishing that the employer had been negligent in failing to provide the employee with a safe place to work. The mere negligence of the employee's cohort on the assembly line would not justify a suit by the employee against the employer; the so-called "fellow servant rule" qualified what otherwise would have been the application of the employer vicarious liability doctrine. Moreover, even in cases where the employer was demonstrably negligent, if the employee learned of the hazard in the job site and continued to work in the face of that hazard, the employee's suit could be barred by the defense of assumption of risk. Both the fellow servant rule and the assumption of risk defense were recognized by California courts in the nineteenth century: in California, at least, it was the fellow servant rule that was most frequently destructive of the employee's claim. (The defense of contributory negligence was also available to the employer, but seems to have been rather sparingly applied.) In 1907, the California Legislature passed legislation which trimmed down, but retained, both the fellow servant rule and the assumption of risk defense. Four years later, however, California, in the vanguard of a national trend, replaced the tort system as³⁰ applied to employee injuries with a program of workmen's compensation. (For obvious reasons, in the 1970's this program was renamed workers' compensation.)

Workers' compensation imposes strict liability on the employer for all injuries suffered by employees which occur "in the course of" the employment and which "arise out of" the employment.³¹ This is a rule that is genuinely strict. It dispenses with all requirements that the plaintiff demonstrate anything like a "defect" or an "ultrahazard." And the strict liability rule is virtually shorn of affirmative defenses--that is, exceptions to or offsets against the general rule of liability. For example: only extreme forms of employee misbehavior--such as voluntary intoxication or being the aggressor in an on-the-job fistfight--disqualifies the employee from a recovery. Thus the employee can

secure compensation even if the immediate cause of the accident is his own carelessness (for example, allowing his hand to slip into a dangerous machine, or falling asleep while driving a car on a job-related trip).

If liability under workers' compensation is strict, however, it is also restricted. The employee, though entitled to a recovery in almost all cases, recovers far less than he would in a successful tort action. To be sure, compensation for the medical expenses that an on-the-job accident entails is complete in most states, including California. But the employee secures no recovery at all for the intangible detriments of an accident, such as pain and suffering, and for the loss of the ordinary pleasures of life, such as sexual capacity. As for lost wages, workers' compensation adopts an intermediate position. Lost wages are, in general, covered by workers' compensation; but the employee receives no more than two-thirds of the income lost, and there is a ceiling on the income which workers' compensation will take into account. Until 1982, for example, the maximum recovery even for total disability in California was two-thirds times \$263.50 a week, or \$175. In 1982, California's workers' compensation law was amended to raise these figures, as of 1984, to two-thirds of \$336 (and \$224).³² In death cases, California has long provided for a flat recovery, one that ignores the wage levels of the particular employee-victim. Until 1982, this recovery was \$75,000; the 1982 amendments raised this figure, as of 1984, to \$95,000. A recovery in this amount, of course, appears trivial in comparison to the recoveries that are now almost routine in tort wrongful death actions.

Application: If an earthquake causes the employer's building to collapse on the employee's head, under workers' compensation the employee can secure a limited recovery without proof of the employer's fault. Even though the causal relationship between employment and injury can be characterized as fortuitous, it can still be said with accuracy that "but for" the job assignment the employee would not have suffered that injury. (Attention here needs to be given, however, to the exact dimensions of the "arising out of the employment" test for workers' compensation, and also to whether workers' compensation includes any liability limitation relating to "Acts of God.")

A concluding note. At the time workers' compensation programs were initiated, programs of job safety regulation were feeble. They remained feeble, moreover, until the adoption of the Occupational Health and Safety Act by Congress in 1970. Presently, the law hence responds to the problem of workers' injuries by affording the strict-yet-restricted liability of workers' compensation, and then by supplementing "comp" with OSHA regulations. This is a provocative combination.

7. Nuclear power plants. There is a final rule, both federal and statutory in origin, that merits mention here. Under the federal Price-Anderson Act, all victims of any power plant "incidents" are entitled to automatic compensation.³³ The pool of compensation for any one such incident, however, is limited by the Act to \$560 million. This pool is itself derived from contributions by power plants, insurance policies purchased by power plants, and a limited Congressional appropriation.

In an "incident" involving a particular power plant, it appears that the company itself would be directly or indirectly liable for a fraction--but only a fraction--of the overall \$560 million sum. The Price-Anderson Act supersedes whatever remedies might otherwise have been available to power plant victims under the state's common law; previous to the Act, scholars such as Prosser³⁴ had assumed that a nuclear power plant was an obvious example of an ultrahazardous activity.

Application: The definition of power plant "incidents" contained in the Act³⁵ seems obviously broad enough to cover whatever catastrophes might be initiated by the occurrence of an earthquake. The negligence of the power plant operator (or any defects in the nuclear reactor) would be irrelevant to the victim's limited recovery.

8. Given the special problems that would relate to buildings in the event of an earthquake, special consideration should be given to the question of who is liable for inadequate building planning.

a. If a Levitt-&-Sons-type operation builds a development, each house within that development is a "product" for purposes of products liability; hence, the developer is strictly liable³⁶ for all "defects" in the house, whether in construction or in design.

b. Assume that a professional builder constructs a single building for a client; it is uncertain whether that building would be³⁷ classified as a "product" for purposes of strict products liability. (The builder, of course, could be held liable for any negligence on its part.)

c. If an architect negligently designs a building,³⁸ the architect is liable to all foreseeable victims of that bad design; there is no "privity" limitation on the architect's liability.

d. If an owner hires a contractor to build a building on the owner's land, and if the owner then accepts the building upon completion, the owner becomes³⁹ vicariously liable for any negligence on the part of the contractor.

C. INTENTIONAL TORTS

A punch in the nose is a battery and an intentional tort. Setting a spring gun to harm a burglar is also an intentional tort, subject to a possible privilege of "defense of property." Engaging in conduct which the actor knows includes some risk of harm (for example, building a structure that is plainly earthquake vulnerable) is not, however, an intentional tort. Only if an injury is "substantially certain" to follow is knowing risk-taking regarded as "intentionally" tortious.⁴⁰ And the "substantial certainty" to which the law here refers evidently requires "certainty" as to a particular victim at a particular time and location.⁴¹ Thus it is not an intentional tort to build a building with knowledge that the building would be inadequate if and when an

earthquake should occur at that particular location: an earthquake at that location is not "a substantial certainty," let alone "a substantial certainty" at any one point in time.

D. COMMUNICATION TORTS

There are a range of torts concerning the communication of incorrect information.⁴² All of these torts require that the misstatement relate to "fact," rather than "opinion" or "prediction." Whether a representation that a building is "earthquake proof" would be regarded by modern courts as sufficiently factual is frankly uncertain.

In any event, for these torts the standard of liability varies rather confusingly. The traditional tort of "fraud" requires, not surprisingly, a fraudulent intent. The tort of "misrepresentation" originally required an intentional misstatement. Currently, however, suits for negligent misrepresentation are generally allowed, and on occasion even innocent misrepresentation suffices (especially when the plaintiff is merely seeking to cancel his contract with the party who innocently conveyed an untruth).

Assume a private party who, in selling an individual building to another party, makes clearly factual representations about the ability of the building to withstand an earthquake that are proven false when an earthquake later occurs. The buyer's suit against the seller would be rendered complicated by all the uncertainties described above as to the standard of liability in a misrepresentation situation. In other situations, however, the owner may merely have failed to disclose to the buyer information about earthquake vulnerability which the buyer would have found important. The traditional tort rule is that while there may be liability for the making of false statements, there is no affirmative obligation to divulge or disclose. A number of exceptions to this rule of non-liability have developed, however. A seller can be held liable if he "actively conceals" a defect (for example, by painting over it); and a seller can be liable for non-disclosure if he stands in a "fiduciary relationship" with the buyer (if, for example, they are members of the same family.) The Second Restatement of Torts has suggested an even broader exception: under the Restatement, a buyer can be liable to a seller for the failure to disclose "facts basic to the transaction" whenever "the relationship between them, the customs of the trade or other circumstances" would lead the buyer to "reasonably expect a disclosure of those facts."⁴³

Assume now that the building sold is one that is mass-produced by an organization such as Levitt & Sons. Such a building might well be regarded as a "product" for purposes of the law of products liability.⁴⁴ That law clearly renders a product seller liable even for innocent falsehoods, under both a Restatement theory of false product representation⁴⁵ and a Uniform Commercial Code theory of express warranty. While products liability law is hence rather "tough" with respect to innocent misstatements, that law has not yet adopted a position as to

the seller's obligation to disclose. Therefore, the uncertainties suggested in the paragraph above relating to the disclosure obligation in tort law generally would equally complicate any suit by a Levittown buyer complaining merely about Levitt's failure to divulge arguably important earthquake information.

II. THE SAFETY PURPOSES OF LIABILITY RULES

A. NEGLIGENCE

It seems clear enough that the nineteenth-century negligence doctrine was primarily intended to achieve man-to-man justice with respect to accident losses. The prevailing idea was that it was unfair to act badly (carelessly, negligently) in a way that causes another to suffer injury. This unfairness can be rectified by requiring the negligent party to afford compensation to his victim.

Consider in this regard the common law's treatment of death. If the accident victim actually suffered death, his heirs had no recovery under the traditional common law.⁴⁶ Correspondingly, even if the victim survived but if the injurer should happen to die before the victim brought his suit, that death terminated whatever claims the victim would otherwise possess.⁴⁷ The way in which death--on either side of the lawsuit--eliminated a claim under the traditional common law dramatizes the extent to which the common law's rules were designed to achieve justice in a very personal way between the victim and his negligent injurer.

Slowly, however, one can begin to see more "practical" considerations entering into tort law thinking. Legislatures enacted statutes, for example, providing for wrongful death recoveries and rendering a decedent's estate liable for his torts. In the early twentieth century, leading writers like Professors Ames and Terry described tort law as "utilitarian"⁴⁸ or as concerned with a balancing of safety advantages and practical disadvantages.⁴⁹ An author of an 1890 article in the Harvard Law Review described negligence in the following way: "[t]he really important matter is to adjust the dispute between the parties by a rule of conduct which shall do justice if possible in the particular case, which shall also be suitable to the needs of the community, and tend to prevent like accidents from happening in the future."⁵⁰ This is perhaps the clearest early statement of the deterrence rationale for the negligence liability rule (though the statement presents deterrence as a supplement to justice rather than as an alternative).

The deterrence rationale was frequently mentioned--though in a very unsystematic way--in tort writings during the following eighty years. By 1970, however, an "economic" approach to accident law problems had become prominent, an approach which emphasized deterrence objectives. Professor Guido Calabresi's most important book, *The Costs of Accidents*, was published in 1970.⁵¹ In that book, Calabresi--while caring greatly about deterrence--was extremely disparaging of negligence liability as a deterrence strategy. Calabresi regarded negligence law as plagued by mainly moralistic considerations that detracted from the achievement of the deterrence objective. In one brief passage Calabresi acknowledged the existence of the Learned Hand negligence test and suggested that it provided the negligence standard with its "best definition"; however, he remained unwilling to take negligence seriously as a liability test that is designed to achieve safety objectives.

Two years later, however, along came Professor (now Judge) Richard Posner. In a 1972 article entitled "A Theory of Negligence," Posner fastened on the Learned Hand negligence formula and insisted that it could serve (and has historically served) as a marvelous "regulatory" device for achieving safety goals. 52 Since then, an enormous literature has developed dealing with the negligence standard in several variations as a technique for achieving appropriate safety results.

The basic deterrence argument can get bogged down in highly technical debates, about whether the cost of safety should be measured in a marginal-cost or an average-cost way. In fact, however, the basic argument is really quite simple. Assume a risk the magnitude of which is \$10,000 (a one-in-a-hundred chance, for example, of a \$1,000,000 loss). Assume, further, that the cost of eliminating this risk is \$7,000. The \$7,000 cost must ordinarily be borne by the potential injurer--the potential defendant. The safety advantages, by contrast, will be enjoyed by third parties. If one assumes that the injurer is only concerned with maximizing his own advantage, in a world without tort liability he will be unwilling to incur a \$7,000 cost even though that cost would achieve a \$10,000 safety benefit. However, because this safety benefit is greater than the expense necessary to achieve safety, the defendant's failure to incur that expense is negligent. Under the auspices of a negligence liability rule, he is led to face an "expected liability" of \$10,000 (that is, a one-in-a-hundred chance of a \$1,000,000 judgment) if he fails to incur that expense. Comparing a safety cost of \$7,000 with an expected liability of \$10,000, the rational actor would be induced to incur the safety expenditure.* Negligence law thus encourages all those forms of safety behavior which seem worthwhile overall.

Assume now that the \$10,000 risk can be averted only by incurring a safety expense of \$15,000. If the magnitude of risk (and hence the expected liability) is less than the cost of safety, the defendant's failure to incur that cost is not negligent and hence not productive of liability. This is a safety expenditure, then, which negligence law will not succeed in encouraging. But likewise (it can be argued) this is an expenditure which ought not to be encouraged, since there is no obvious reason for society to prefer a situation in which \$15,000 is expended in order to produce a benefit of only \$10,000. Negligence law, then, achieves all that it is appropriate to achieve by way of risk reduction--no less than that, and also no more. What negligence law in essence entails, pursuant to this view, is the application of a cost-benefit analysis to the problem of safety.

* There is a caveat, however, if the actor is somewhat rational but also somewhat indigent, he might decline to incur the certain cost of safety in favor of facing the possible cost of liability. His immediate need for cash might override his fear of possible future liability; and he might be aware that bankruptcy would be available to relieve him of that liability. Tort law may thus work erratically when applied to low-income defendants.

A strong safety logic can thus be adduced in support of the negligence liability rule. It is worthy of note, however, that empirical verification of the safety consequences of a negligence liability rule is hard to come by. Until recently, there were almost no empirical studies worthy of mention. In recent years, two such studies have appeared, whose conclusions go off in different directions. One study, by Jerry Wiley, 54 considered Helling v. Carey, 55 a Washington Supreme Court opinion holding that it is malpractice as a matter of law for ophthalmologists to fail to provide a glaucoma pressure test as part of a general eye examination. Wiley's study found that the Helling rule had remarkably little effect upon the behavior of Washington doctors. A substantial percentage of them performed the glaucoma pressure test prior to Helling; the percentage did not go up in any notable way subsequent to Helling. There are complicating factors, however, that weaken the power of the Wiley findings. One factor is that the Washington legislature, shortly after the Helling decision, enacted a statute that certainly appeared to overrule Helling. 56 If Washington doctors were taking account of the statute, this would explain why they were ignoring the directive that Helling had seemingly issued.

A second study, conducted by Elizabeth Landes, has just been published. 57 Auto No-Fault plans limit (though they do not eliminate) the tort liability of the negligent motorist for the harms which he causes. The "stronger" the No-Fault law, the greater its curtailment of tort liability. The Landes study compares the fatal accident rate in states without auto No-Fault to the rate in states with a "weak" No-Fault law, and states with a "strong" No-Fault law. The conclusion the study comes to is that "No-Fault kills"--or (conversely), that full negligence liability saves lives. According to Landes, a weak No-Fault law increases the rate of highway fatalities by ten percent, while a strong No-Fault law increases the fatality rate by fifteen percent. The Landes study may have its imperfections, but it presently stands as the most impressive empirical documentation of the claim that negligence liability provides safety advantages.

Even that study, however, declines to claim that a negligence liability rule is successful in eliminating all negligent conduct. And, indeed, it seems obvious that the incidence of negligent behavior is quite high--despite the existence of the negligence liability rule. In that regard, one can identify many elements of fallibility in the safety logic on behalf of negligence liability that has been set forth above. These weaknesses are described below.

1. Non-Liability-Rule Incentives. In considering the importance of the safety incentives furnished by a negligence liability rule, one must also consider whatever additional incentives a potential injurer has for avoiding accidents. These incentives can take the form of the desire to avoid injury to the defendant's own person or property. An auto driver who considers speeding can anticipate an injury to himself as well as an injury to others; his interest in (or his instinct for) self-preservation can be expected to significantly constrain whatever his interest may be in speeding. 58 A negligent explosion may damage a company's own property as well as the property (and persons) of innocent bystanders; the company's interest in preserving its own property

provides it with an incentive to avoid that negligence. (Three-Mile Island was an extreme disaster for the General Public Utilities Corporation, quite without regard to the question of its potential liability.)

Conclusion: the greater the damage that an accident would cause to an entity's own person or property, the less significant negligence liability will be in inducing safety. Thus the damage that an earthquake would do to the building itself gives the building's owner some incentive to have it built safely with respect to the earthquake risk.

2. Economic-Contractual Incentives. Moreover, when the foreseeable victims of the defendant's negligence are potential customers of the defendant, the defendant's interest in pleasing those customers gives it a strong contract-oriented interest in avoiding unnecessary accidents, and the publicity that may surround them. Thus the crash of a DC-10 outside Chicago--by suggesting that the DC-10 may well be unsafe--resulted in a significant loss of business by its manufacturer, McDonnell Douglas. After the public acquired knowledge of the characteristics of the Pinto gas tank, the damage that the Ford Motor Company suffered in the marketplace (by way of lost sales) greatly exceeded the liabilities to which it was subjected in private law suits.

Conclusion: the greater a defendant's contractual self-interest in avoiding accidents, the less significant a negligence liability rule is in encouraging safety. Thus an electric power company does not want to antagonize or alienate its clientele.

3. Regulation. Courts may impose tort liabilities as a way of encouraging safety. At the legislative level, the safety objective is often strived for through the medium of regulation. Presumably, in issuing regulations, legislatures undertake the same kind of risk-benefit analysis that the negligence doctrine embodies. For many categories of accidents, public regulation is quite extensive: almost every negligent act which a motorist might engage in, for example, is a violation of some provision in the state's vehicle code. The motorist thus faces liability in tort should an accident result; but that motorist also faces a public fine upon apprehension, and this fine can be imposed whether or not an accident occurs. While there is extensive regulation relating to some categories of accidents, there is limited regulation for other categories (for example, product-related accidents) and almost no regulation for other accident categories (for example, accidents resulting from medical treatment).

Conclusion: the more extensive are programs of public safety regulation and the more effective their enforcement, the less significant negligence law may be in encouraging safety. There is substantial regulation of the safety of nuclear power plants.

It should be noted, however, that public regulation and private tort liability are not mutually exclusive undertakings. If the conduct of a defendant which results in injury does indeed violate a safety regulation, (and hence subjects the defendant to a public fine), the

victim of that injury can rely on that violation as a way of establishing that the defendant's conduct is "negligence per se" (negligence as a matter of law). By virtue, then, of the negligence per se doctrine, negligence law can contribute to the enforcement of regulatory programs; and those programs can in turn improve the system of negligence liability, by reducing the uncertainties that otherwise inhere in negligence law's reasonableness conduct; and by easing the victim's burden of proof. The relationship, then, between regulation and negligence liability may well be synergistic.

A local parapet-prohibiting ordinance would be a good example of a public regulation which directly deters, and which by so deterring reduces the need for a tort suit; still, such a regulation could also be "enforced" in a tort suit that relies on violation of the ordinance as establishing negligence per se.

4. Inadequate Information. An additional deficiency of negligence law is that it requires the rendering of a number of complex calculations--calculations bearing on the probability and severity of the risk and on all the disadvantages of the alternatives available to the⁵⁹ defendant that might provide greater safety to potential victims. For a court to gather "full information" on all of these variables would undoubtedly impose costs (on the public court system itself and on the private parties' lawyers) that would be prohibitively expensive. What is likely to ensue is a situation in which the parties incur substantial expenses in order to present evidence that goes some of the way--though not all of the way--towards clarifying the variables in the negligence formula. In sum, a negligence system that produced perfect findings would be excessively expensive to administer; we are likely to be satisfied, therefore, with a negligence system that includes a considerable potential for inaccuracy.

Conclusion: the more "complex" a plaintiff's negligence argument, the less effective negligence law may be in achieving appropriate safety levels. Certain questions about how to design products relative to earthquake risks might seem, for example, excessively difficult.

5. Valuing Life. There is, moreover, a related problem. In order to reach judgment on whether or not a defendant's conduct is negligent, the law of negligence evidently requires that valuations be rendered that many find just about impossible. Assume that the defendant's activity runs a small risk of the loss of life or the imposition of a permanent and total disability. Who is to say what the value is of life itself? Indeed, does not our Judeo-Christian tradition suggest that life is of infinite or at least indefinite value? And how can a humane law possibly put a price tag, for example, on the condition of being rendered a quadriplegic? If life is of infinite value, and if suffering from quadriplegia is an infinite detriment, then negligence law would require a defendant to adopt infinite precautions whenever his behavior runs some risk of the loss of life and limb. Yet negligence law clearly (if somewhat tacitly) operates on the assumption that the obligations it imposes are both finite and measurable.

Conclusion: the more the defendant's conduct runs a risk to life itself, the less satisfactory the negligence system will be in setting standards that establish appropriate safety levels.

6. Damages For Death. Problems of death and serious injury affect not only determinations of liability, but also the calculation of damages once the existence of liability is acknowledged. The problem here is that the damages which a tort court imposes may be significantly less than the harm which the defendant's negligence actually creates. Returning to the original hypothetical, assume that the actual risk is \$10,000 (a one-percent chance of a \$1,000,000 loss), that the cost of safety is \$7,000, but that the judgment of damages which a court will impose, if the one-percent chance materializes, is only \$600,000 (rather than the full \$1,000,000). In these circumstances, the narrowly rational and non-altruistic defendant will be quite willing to engage in negligent conduct, since the cost of safety (\$7,000) exceeds the expected liability ($1\% \times \$600,000 = \$6,000$). And indeed, the damages that tort law allows do seem less than the harm that victims suffer in at least two important classes of cases. Most people would agree that there is no imaginable sum of money that would make them agreeable to undergoing a lifetime of serious pain and suffering or a permanent and major disability; insofar as the damages allowed by the law in these cases are substantial but still in some sense moderate, those damages are undercompensatory. Even more important is tort law's characterization of the damages resulting from death. In a death case, the members of the victim's family are allowed to recover for the material (and to some extent non-material) harms that they suffer on account of the death of their family relation. No damages are awarded, however, to take into account the value of the victim's life to the victim himself. The ignoring of this element of loss is in a way understandable: the victim having died, there is no plaintiff who is an obvious recipient for the damages that reflect the value of the victim's life to the victim himself. But insofar as tort law thereby ignores this value, damages in a wrongful death action--substantial though they are--may well incorporate only a fraction of the full loss which the fatal accident has occasioned.

Conclusion: tort law will underdeter when the defendant's conduct creates a risk of death or a very serious injury. This is generally true in the earthquake situation.

7. "Featureless Generality." The points above easily suggest an additional deficiency of the negligence liability standard when regarded as a guide to defendant conduct. The problem is that the effective meaning of its "reasonableness" standard may be extremely difficult to ascertain in advance.⁶⁰ Everything depends on a balancing of multiple factors which yields no certain result. This might lead to "underdeterrence," if a court eventually sets a standard higher than that which the defendant had previously estimated. It could also lead to "overdeterrence" if the defendant overestimates what a court will eventually require.

The uncertainties inherent in the negligence or unreasonableness concept are enhanced by the legal system's procedures for adjudicating

whether negligence exists. A potential tort defendant cannot come into court seeking a declaratory judgment as to whether its proposed conduct does (or does not) comply with the reasonableness norm. A tort trial is always after the fact, and this retroactive perspective is likely to bias the analysis. The probability of the risk, objectively regarded, may be quite low. Yet--after the risk has materialized in an actual injury--the temptation is great for the fact-finder to conclude that the accident probability was rather substantial after all.

Additionally, the determinations of negligence or unreasonableness are rendered, under the law of almost all states, by the jury. An ad hoc lay jury is more likely than a professional judge to allow perceptions to be distorted by the lens of hindsight; and according to the traditional understanding of lawyers, tort juries are swayed by a pro-plaintiff bias. The decisions of juries may be erratic as well as inaccurate. Juries decide cases--often with the judge's encouragement by way of amorphous instructions--on the basis of lay instincts. To the extent that parties cannot predict how a jury will decide, they cannot shape their conduct in a way that will render it consistent with the jury's judgment.

Jury verdicts, moreover, decide only the immediate case. Even if the jury issue in case B is exactly the same as the jury issue in case A, the jury's verdict in case A is neither binding as precedent nor even admissible as evidence in case B. It was Oliver Wendell Holmes who complained about the "featureless generality" of tort law's reasonableness standard, and who recommended--as a way of providing the standard with some "features"--that once a particular "reasonableness" issue begins to recur in case after case, the issue be decided by the judge rather than the jury.⁶¹ Justice Traynor has made a similar recommendation in California.⁶² These recommendations have been ignored: the jury continues to predominate.

Conclusion: the more uncertain (in context) the negligence standard's meaning, the less effective the standard will be in inducing safety.

8. Injurer Altruism. Negligence law's safety logic assumes, first of all, a lack of altruism on the part of the defendant. That is, it assumes that except for the threat of liability, the defendant has no interest in incurring expenses himself in order to avoid inflicting injury on others. To the extent that people are willing in an altruistic way to incur safety expenses for the sake of others, negligence law achieves nothing that would not be achieved in its absence.

Conclusion: the more altruistic potential injurers are, the less significant negligence law will be in achieving safety. A public-entity defendant might be more "altruistic" than a private-entity defendant.

9. Injurer Rationality. Moreover, even if one denies that defendants are altruistic, the negligence liability rule can achieve its desired effects only if defendants behave in ways that are "rational" pursuant to rather narrow definitions. If it is true that defendants in

general--or at least certain classes of defendants--are not able to make, or are not psychologically inclined to make, the kind of fine calculations that negligence law presupposes, then negligence law will not be successful in achieving its desired safety objectives.

Conclusion: the more "rational" potential injurers are, the more effective the negligence doctrine will be in achieving safety. Corporations might behave more "rationally" than private persons.

10. The Problem of Inadvertance. The assumption of rationality becomes all the more problematic when one recognizes that many instances of negligent conduct involve situations of inadvertence--situations in which the defendant has simply failed to even recognize the risk in question. The Learned Hand formula seems to assume an actor who, as he contemplates engaging in risky conduct, weighs the benefits he would receive from that conduct against his expected liability, and who thus can be dissuaded by that expected liability from undertaking the conduct. If the risks in question are, however, not even perceived by the defendant--if his supposed negligence consists in his failure to perceive them--then it is hard to see how the safety incentive goals for negligence liability can be realized.⁶³

To be sure, though particular instances of negligence may be inadvertently risky in the short run, those instances can perhaps be seen as flowing from the individual's general longer run decision as to how much care to exercise in his day-to-day affairs. Insofar as people do consciously make such long-run decisions which are then effective in guiding instances of day-to-day conduct, that latter conduct may be at least somewhat subject to the rational influence of a negligence liability rule. Negligent conduct that seems immediately "mindless" may become somewhat mindful after all.

Conclusion: the greater the extent to which the defendant's risktaking is inadvertent rather than deliberate in character, the less effective a negligence liability rule will be in influencing that conduct. A defendant who has thought about earthquakes is more likely to be influenced by the threat or liability than a defendant who is negligently oblivious to earthquake risks.

11. The Punitive Damage Kicker. The distinction between inadvertently and deliberately risky conduct has other implications, moreover. As noted, the Learned Hand formula defines negligence in a way that almost presupposes conduct that is deliberately risky. In the criminal law, however, negligence has been rather officially defined as risk-taking that is accidental or inadvertent in character.⁶⁴ For the criminal law's purposes, conduct that is both unreasonably and also deliberately risky will often be characterized as "reckless."⁶⁵ Within the law of torts, however, if the defendant's behavior can be given the "reckless" label, it becomes possible for the jury not only to require the defendant to compensate the plaintiff, but to require that defendant to pay an award of punitive damages as well.⁶⁶

Consider the defendant who is aware of the riskiness in his conduct, who is also aware that the alternatives to that conduct seem in

one way or another unsatisfactory, and who hence decides to engage in that conduct after all. Under the Learned Hand formula, this decision merely sets the stage for a later jury review of the decision, which would enable the jury to disagree with the defendant and determine that his behavior is negligent after all. Given, however, the confusion and what may be the lack of intelligence that has entered into recent punitive damage judicial opinions, the defendant, in acknowledging the riskiness of his conduct, runs the risk of being subjected to an enormous punitive damage penalty. Call this the "punitive damage kicker": the defendant who responsibly worries about his risk-taking in a way that the Learned Hand formula encourages may be found guilty by the jury of rendering a decision that displays a "conscious disregard" for human safety, and may therefore be subject to a punitive damage obligation.⁶⁷

12. Liability Insurance. Finally, as Calabresi points out, our negligence liability system tolerates--indeed in many way encourages--the purchase of liability insurance.⁶⁸ By relieving the injurer of the immediate burden of liability, liability insurance greatly weakens the deterrence consequences of the negligence liability rule. Return to the illustration above of the \$10,000 risk that can be eliminated by a \$7,000 safety expenditure. Assume further that the defendant has purchased (for whatever price) a full negligence liability insurance policy. While the \$7,000 cost of safety is less than the \$10,000 cost of liability, this is a liability cost which the defendant himself is no longer required to bear: it is borne instead by his liability insurer. The defendant is thus faced with a \$7,000 safety cost in comparison with a "net" liability cost of zero. Assuming that the defendant is merely self-interested, he will forego the safety expenditure and allow the accident to happen.

The extent to which insurance reduces the incentives that would operate in the absence of insurance is well recognized in the economic literature; it is referred to as the problem of "moral hazard." For safety purposes, there is no full, general solution to the moral hazard problem. There are, however, partial solutions.

a. First of all, a defendant obviously knows that his "return" on an insurance policy is something less than 100 percent. The insurance company expects to make a profit on the policy; and the insurance company bears necessary overhead costs in merely soliciting and processing the application for the policy in the first place. If the defendant has enough assets to render acceptable the prospect of bearing a substantial tort judgment, the defendant may well choose to dispense with insurance: to "self-insure," to "go bare." Self-insurance obviously eliminates the moral hazard problem altogether.

Conclusion: the greater the incidence of self-insurance, the more effective negligence law will be in inducing safety. The larger the defendant's enterprise, the more likely it is to self-insure.

b. Secondly, the insurance company may well offer a policy with a significant deductible, one which the insured is willing to accept. For the insured, the deductible reduces the price of the insurance policy.

For the insurer (and for the public interest), the deductible signifies that the insured "retains" some liability and hence likewise retains some incentive to avoid negligent conduct, despite his insurance policy. A deductible can of course be characterized as partial self-insurance.

Conclusion: the higher the deductible in whatever insurance policies are written, the less those policies will reduce the safety incentives of the negligence liability rule.

c. Third, the premiums the insured pays may be calculated in a way that takes into account the insured's past record in committing (or avoiding) negligence. If so, then the insured can and will appreciate that any negligence on his part during the policy year will raise his premium in following years; the insured hence has at least some incentive to avoid these acts of negligence. The extent to which an insurance company engages in "experience rating" depends on the "credibility" of an insured's past experience in enabling the insurance company to predict what his future performance will be. The larger the insured's operations, the more extensive and hence the more "credible" his experience.

Conclusion: the more that insurance policies include experience rating, the less they detract from the safety incentives of negligence liability.

d. If the physical conditions that might be conducive to claims of negligence liability are "in place" at the time the application for insurance is submitted, the insurer can inspect those conditions and set a premium that takes into account the liabilities they might produce. The applicant, in turn, would have an incentive to remedy those conditions in order to reduce its premium. Moral hazard is thus effectively nipped in the bud.

Conclusion: the more feasible it is for an insurer to detect negligence in advance by inspecting the insured's premises, the less the eventual insurance policy detracts from the safety goals of negligence liability. The larger the insured's premium, the more economically feasible it is for the insurer to conduct an inspection.

B. STRICT LIABILITY

Just as there are ethical principles supporting negligence liability, so it is possible that ethical ideas provide support for some rules of strict liability. In certain circumstances, for example, it may be thought only fair to require a defendant to pay for the harm which his conduct has actually caused, however free of negligence that conduct may be. This ethical precept may well seem most obvious in the blasting cases. If the harm which a neighbor suffers is the direct consequence of the blaster's knowingly risky activity, it may well seem only fair to require the blaster to provide compensation.

As with negligence, however, economic theorists have delved into strict liability; in doing so, they have developed a variety of

arguments suggesting why strict liability might possibly be beneficial from the perspective of safety.

1. One advantage of strict liability might well seem ironic. Strict liability might do a better job than a negligence liability rule in discouraging conduct that is in fact negligent.⁶⁹ In other words, a strict liability standard might be more successful than a negligence liability standard in achieving the latter's own assumed goals. This might be so for a rather understandable set of reasons. Under a negligence system, a victim injured by the defendant's conduct or operations is required, in order to recover, to figure out in exactly what way the defendant's conduct may be negligent, and then to demonstrate that negligence to the satisfaction of a perhaps erratic jury. If the plaintiff is unable to detect the defendant's negligence or unable to prove that negligence in a sufficiently persuasive way, then the negligent defendant may well succeed in escaping liability.

A rule of strict liability, by contrast, may well guarantee that a defendant will adopt all precautions that the negligence rule itself supposedly requires. Consider, for the sake of example, the strict liability rule of respondeat superior (the employer's liability for the employer's negligence). Without this rule, a person injured by an employee's negligence can still recover from the employer if he can demonstrate the employer's negligence in selecting, in training, in supervising, or in failing to discharge a particular employee. Now, the employer may well have been negligent in one or more of these respects, but it may be very hard for the plaintiff to nail this down. The employer, far more than the victim-plaintiff, is able to identify what reasonable techniques are available for purposes of screening potential employees, for training and supervising existing employees, and for disciplining and discharging substandard employees. A rule of strict liability directed against the employer encourages the latter to adopt whatever measures are in fact reasonable. That is, so long as the employer knows that it will be liable for all \$10,000 risks (one-percent risks of \$1,000,000 injuries) resulting from the employer's operations, the employer under strict liability will have a strong incentive to adopt all risk-prevention strategies the cost of which is less than \$10,000.

2. There is a second way in which strict liability might do a better job than negligence law in the achievement of the latter's stated goals. Assume a blaster who carries out his blasting in an extremely proper way. That person may well be engaging in blasting for substantial economic purposes of his own. Nevertheless, that blasting will quite likely inflict some measure of harm on the blaster's neighbors. Technically speaking, the activity of blasting may be negligent in and of itself--if the overall benefits of that activity are less than the overall risks that it imposes on neighboring landowners. Alternatively, the blasting activity may be negligent if there is some alternative means of excavation that could substantially achieve the landowner's objectives. The landowner thus may be technically negligent in blasting at all, or in blasting rather than engaging in the alternative method of excavation.

However: these are rather "high level" or very complex negligence arguments--and a court may well feel itself incompetent to consider them. If so, then these instances of possible negligence on the part of defendants might effectively escape judicial recognition. (See the discussion at pages 18 - 19.) By virtue, then, of the court's acknowledgement of its own limited competence, strict liability might (again, ironically) do a better job than negligence law in achieving the latter's stated objective of ⁷⁰preventing all negligent or non-risk-beneficial choices.

3. In other cases covered by strict liability, however, there simply may be nothing reasonable that the defendant can do to prevent injury, at least in the short run. Assume that the magnitude of the risk can be valued at \$10,000 and that the cost of risk prevention is \$13,000. In these circumstances, the defendant is not negligent in declining to accept that cost, and would not be liable if negligence were the standard of liability. A strict liability rule (if applicable) would hold the defendant liable--but it would not produce any immediate safety effects, since the defendant would prefer to face an expected liability of \$10,000 rather than to incur a safety cost of \$13,000. Consider now the long-run picture, however. Strict liability informs the defendant that he is and will remain liable in all cases. Strict liability might thus give the defendant a keen incentive to engage in long-run safety research projects that will eventually be successful in developing reasonable-cost safety technology; the defendant can then adopt ⁷¹that technology in order to minimize its ongoing tort liability. There may, therefore, be long-run safety advantages in a strict liability rule.

The various arguments advanced above might explain why workers' compensation would be more effective than negligence in encouraging safety. a. As described above in the context of vicarious liability, there might often be employer negligence which the injured employee is unable to identify and prove. b. The employer's possible negligence might be high-level negligence (for example, utilizing employees rather than machines) that the courts might feel incompetent to consider. c. A strict liability rule might give employers a long-run incentive to develop programs or strategies that will eventually be effective in improving the employee's accident record. In fact, one empirical study of seemingly high quality has found that the replacement of negligence law with workers' compensation back in the 1910s was causally responsible for a significant reduction in the rate of fatal on-the-job injuries.

Notice, however, that the strict liability rule of workers' compensation is tied to a rule of limited damages. Not only does this rule reduce the deterrence advantages of strict liability, but in some instances it might even render strict liability less effective as a safety measure than negligence liability. Assume that employer conduct creates a risk of \$10,000 (a ten percent chance of a \$100,000 accident) that the cost of safety is \$7,000; and that the employer's limited liability under workers' compensation reduces the employer's expected liability down to \$5000 (\$50,000 in the ten-percent situations in which an accident occurs). In such a case, the strict-but-restricted

liability rule of workers' compensation would leave the employer without an adequate incentive to refrain from clearly negligent conduct.

A similar point can be made about the strict-but-limited liability rule applicable to nuclear power plants pursuant to the Price-Anderson Act. Obviously, the harm of a single power plant "incident" could easily exceed \$560,000,000. Assume a one-percent chance of a \$100 billion catastrophe that the power plant could avoid by incurring a safety cost of \$800,000,000. Under negligence liability, the power plant should be willing to incur an \$800,000,000 safety expenditure in order to avoid an expected liability of \$1 billion (1% x \$100 billion). But under the Price-Anderson Act, a plant might be unwilling to incur an \$800 million cost merely to avoid a maximum liability of considerably less than \$560 million.

Relying on observations of the sort suggested here, one federal district court judge held the Price-Anderson Act unconstitutional; the judge argued that the Act would "encourage irresponsibility in matters of safety," and thought the Act unfair insofar as it deprived victims of their full common-law rights without providing anything by way of a "quid pro quo."⁷² The United States Supreme Court, however, promptly agreed to review this lower court ruling, and proceeded to hold that enactment⁷³ of the Price-Anderson Act was well within the authority of Congress. The Court noted that power plant operators have strong economic incentives to avoid "incidents" that render the safety effects of strict liability not all that important. And the Court greatly doubted that Congress is required to provide a "quid pro quo" when Congress modifies common-law rules. In any event, the Court noted that it was far from certain that all states would regard nuclear power plants as subject to a strict liability rule. The automatic compensation guaranteed by the Act thus satisfied, the Court concluded, whatever the Constitution may possibly require by way of a quid pro quo.

There are a number of safety arguments, then, in favor of a rule (or rules) of strict liability. These arguments are subject, however, to many of the same limitations and caveats that afflict negligence liability, as those limitations and caveats have been described above. Thus the strict liability safety theories assume a quite "rational" defendant; they assume a defendant who is conscious of the risks in question; they assume a defendant who would be solely self-interested; if the damages which a court awards do not embody all of the harm that the defendant's conduct engenders, even strict liability will underdeter. Additionally, strict liability--like negligence liability--is insurable; and the prospect of insurance reduces the likelihood that strict liability will achieve its desired safety effects.

Workers' compensation dramatizes these insurance considerations. Not only does the workers' compensation program allow employers to purchase liability insurance; the program requires employers to purchase that insurance (unless the employers can prove that they are financially capable of self-insuring). Insurance, of course, guarantees that the employee will not be deprived of compensation on account of the employer's inadequate solvency. That workers' compensation indeed

requires insurance seemingly establishes an important point: that within workers' compensation, the goal of compensation takes precedence over the goal of safety.

Of course, a strict liability insurer--like a negligence insurer--can adjust the premiums it charges in a way that takes into account the particular defendant's liability risk, and thereby subject the defendant to at least some of the costs of liability, insurance notwithstanding. In workers' compensation, for example, the premium that every employer pays takes into account the accident characteristics composition of his work force. Employers of high-rise window washers thus pay much higher premiums than employers of office workers. And employers who hire more than a certain number of employees are "experience rated": that is, their insurance premium for the following year is based, at least in part, on their accident record during the three preceding years. Only fifteen percent of all employers are large enough to be experience rated; but these employers account for eighty-five percent of all employees. Moreover, a limited number of these employers choose to dispense of liability insurance and to self-insure. Something like one-percent of all employers are self-insurers, but these are large operations which account for something like fifteen percent of the overall work force.

A few words are in order on the differences in "transaction costs" or "administrative costs" between negligence and strict liability. Strict liability is less costly to administer in the sense that it eliminates the "expensive" issue of negligence. But strict liability obviously generates more claims than does a negligence liability rule; if each of these claims bears a necessary "overhead" (the expense of litigating damages, for example), then strict liability adds to the total costs of administration. Whether negligence or strict liability is, overall, less expensive to administer is apparently an empirical question the answer to which may vary from context to context.

C. THE SPECIAL PROBLEM OF EARTHQUAKES AND OTHER NATURAL DISASTERS AS LOW FREQUENCY OCCURRENCES

Many of the safety consequences of negligence liability and strict liability that have been detailed above have concerned accidents that happen on a day-in, day-out basis. The particular feature of earthquake safety is that a serious earthquake--foreseeable though it may be--is something that may happen only once in a decade, or once in a century. To be sure, there is a distinct earthquake risk that can be calculated and talked about in a rather manageable way. A "rational" defendant will take the earthquake possibility into account in an intelligent fashion. As noted above, not all potential defendants may be fully rational in a way that liability rules seem to assume. If defendants are inclined to ignore or suppress, in their thinking, the earthquake possibility, this is an element of non-rationality that would reduce the incentive effects of both negligence liability and strict liability. What psychologists call "cognitive dissonance" (i.e., the tension between some new fact and a person's more basic attitudes)⁷⁴ may

prevent some individuals from fully considering the prospect of something quite as apocalyptic as a major earthquake. The cognitive dissonance hypothesis is tentatively confirmed by California insurance information. Only five percent of all homeowners in California have chosen to purchase earthquake insurance; the figure is seven percent in San Francisco.⁷⁵ Given the extent of competition among insurance companies, one is required to assume that earthquake insurance is fairly enough priced. Homeowners' unwillingness to purchase this insurance thus may well betray their inability to come to grips in a rational way with the prospect of an earthquake disaster.

Move now from the personal to the corporate level. It is often said that corporate executives in this country are under incentives that leave them excessively concerned with profits in the short run and inadequately concerned with the corporation's long-run profit situation. (American corporations are here distinguished from their Japanese counterparts, which supposedly are more disciplined to pursue long-run goals.) If this is a correct description, then executives in rendering decisions on behalf of their corporations may well fail to give due attention to the future earthquake contingency.

The special quality of earthquakes also bears on the question of insurance and insurability. Individuals generally purchase insurance in order to minimize the risks which they face. By virtue of the "law of large numbers," however, the insurance company, by writing a large enough number of insurance policies, greatly reduces the risks which it encounters. Assume that one motorist per a thousand can be expected to have a serious accident in any particular year. By writing a thousand auto insurance policies, a liability insurer all but eliminates the riskiness of its own operations.

The law of large numbers assumes, however, that the risks relating to each individual are "independent" of the risks relating to other individuals. In the earthquake situation, by contrast, there is a "dependency" rather than an independency, of risks. The earthquake that damages one building is likely to damage a thousand other buildings as well. Consider an insurance company that writes earthquake insurance policies for a thousand buildings, all of them in West Los Angeles. In these circumstances, the law of large numbers succeeds in magnifying rather than minimizing, the risks which the insurance company is encountering. Since insurance companies, in writing policies against earthquakes, are detrimented rather than benefitted by the law of large numbers, it should be not surprising that earthquake insurance is as expensive as it seems to be; and its expensiveness may be one important reason why so many homeowners have declined to purchase it.

Footnotes

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20. See *Barker v. Lull Engineering Co.*, 20 Cal. 3d at 435, 573 P.2d at 456, 143 Cal. Rptr. at 239.

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28. See, e.g., M. Horwitz, *supra* note 1, at 201; L. Levy, *The Law of the Commonwealth and Chief Justice Shaw* 166-67 (1957).
29. See Schwartz, *Tort Law and the Economy in Nineteenth-Century America: A Reinterpretation*, 90 Yale L. J. 1717, 1732 & n. 123 (1981).
30. For support for the above paragraph, see *id.* at 1768-71.
31. See A. Larson, *Workmen's Compensation Law* (1982). The Larson treatise elaborates on all of the features of workers' compensation discussed in the text.
32. The 1982 statute is Ch. 922.
33. 42 U.S.C. § 2210 (1976 ed).
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35. 42 U.S.C. § 2014(q) (1976 ed).
36. See *Kriegler v. Eichler Homes, Inc.*, 269 Cal. App. 2d 224, 74 Cal. Rptr. 749 (1969); Annot., 25 A.L.R. 4th 351 (1983).
37. Cf. *Miller v. Los Angeles Flood Control Dist.*, 8 Cal. 3d 689, 505 P.2d 193, 106 Cal. Rptr. 1 (1973); see generally Annot., 25 A.L.R. 4th 351 (1983).
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42. The following draws on W. Prosser, *supra* note 11, at 683-737; James & Gray, *Misrepresentation*, 37 Md. L. Rev. 286, 488 (1977-78).
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68. See G. Calabresi, *supra* note 47, at 239.
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75. This information has been provided by the Insurance Information Institute in San Francisco.

BACKGROUND RESEARCH REPORT 2

PERCEPTIONS OF EXPERTS ON EARTHQUAKE-RELATED KNOWLEDGE--

**Results of a Survey Conducted as Part of a Project on
Private Sector Liability for Earthquake Hazards and Losses**

June 1983

Association Of Bay Area Governments

CREDITS

Staff:

Jeanne Perkins, Earthquake Preparedness Program Manager and
Project Principal Investigator; ABAG

Douglas Detling, Legislative Affairs Officer; ABAG

Richard Eggerth, ABAG Associate Legal Counsel; Benner, Harris
and Moy

Claudia Jane Maupin, Research Director; Solem and Associates
Kenneth Moy, ABAG Legal Counsel; Benner, Harris and Moy

Marcia Loss, Administrative Officer; ABAG

Josie Spurlock, Research Assistant; Solem and Associates

Technical Assistance:

Henry J. Degenkolb, President; H. J. Degenkolb Associates, Engineers

Project Review Committee:

Rod Diridon (Chairman) - Santa Clara County Supervisor
Stanley Scott (Vice Chairman) - California State Seismic
Safety Commission

Robert D. Brown - Geologist, U.S. Geological Survey
Henry J. Degenkolb - H. J. Degenkolb Associates, Engineers
Peter B. Hawes - Design Professionals Insurance Corporation
John H. Larson - Los Angeles County Counsel
Bruce D. Oliver - Kaiser Aluminum and Chemical Corporation
H. Roger Pulley - California Office of Emergency Services
Arvo Van Alstyne - State of Utah Commissioner of Education
Charles T. Van Deusen - Pacific Gas and Electric Company

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INTRODUCTION

In general, tort liability will be imposed when an individual or company fails to use due care and such failure causes harm to people or damage to property. Under certain circumstances, the state of knowledge, among experts in particular fields and the general public, aids in the legal determination of an appropriate standard of "due care" which ought to be observed by the actor. The state of knowledge about earthquake hazards and earthquake hazard mitigation may be important elements in evaluating the potential tort liability of the private sector for earthquake damage and losses. If the knowledge to identify earthquake hazards exists, should the reasonable person take steps to avoid the hazards? If the knowledge to identify earthquake hazards and to mitigate such hazards exists, should the reasonable person either avoid the hazard or abate it? Tort liability may be imposed if the answer to either question is "yes".

Using a written survey of a preselected sample of experts in the fields of geology; soil and foundation engineering; structural engineering; architecture; emergency services, medicine and response; insurance and finance, ABAG and Solem and Associates found general agreement on several conditions which constitute earthquake hazards and appropriate mitigation measures. The questionnaire addressed three areas of knowledge: geology; structural engineering; and emergency services and preparedness. Information was gathered on current knowledge of earthquake hazard conditions to determine:

- o the consensus, if any, within key professions; and
- o the extent that this knowledge is shared by professionals in related fields.

In general, the survey questionnaire asked the respondents to rank, on a numeric scale, the degree of danger posed by a specific hazard or the necessity for a specified mitigation measure in a given situation. Due to the limited size of the sample population and the preselection of experts by ABAG staff, Solem and Associates and H.J. Degenkolb, survey results are analyzed by comparing the mean values of the ratings given a particular hazard or mitigation measure. Therefore, throughout this discussion, conclusions regarding relative hazard or safety levels are based on comparisons of mean ratings.

MAJOR CONCLUSIONS

GEOLOGIC HAZARDS

This section of the survey was designed to determine the degree of hazard associated with particular geographic locations and geologic conditions for two specified types of structures.

1. Generally, the experts in geology and soil and foundation engineering, and the entire group of experts, agreed in their subjective estimates of extent of damage for hazards posed by various geologic conditions.
2. With reference to one-story wood-frame structures, the greatest probability of substantial damage was felt to be associated with location on a known active trace of the San Andreas fault. Other locations where substantial damage was felt to be probable were Bay mud in the vicinity of San Francisco Bay, 100 feet from a major active fault on typical alluvial materials (valley soil), and on a site corresponding to an active fault trace shown on a map issued by the California State Geologist pursuant to the Alquist-Priolo Special Studies Zones Act.
3. Experts felt that a flexible eight-story concrete and steel structure would also probably be damaged significantly if located one mile from a major active fault on typical alluvial materials (valley soil).
4. The experts felt that a damaging earthquake (magnitude 6 or more) on the San Andreas fault probably will occur within the next 10 years in the Los Angeles area. Such an earthquake was felt to be less likely to occur on that fault in the Central Coast area or in the San Francisco area in the same 10-year period.

STRUCTURAL HAZARDS

This section of the survey was designed to determine the degree of hazard associated with particular types, designs and ages of structures at a single, given location during a specified earthquake event. A magnitude 7 earthquake was chosen because of the likelihood of significant damage occurring over a fairly large area. Degree of hazards varied with building type and date of construction.

1. Variations among performance characteristics for specified buildings were not as great as among the buildings characterized.
2. There is significant and frequent disagreement between the structural engineers and architects and the overall group in their respective evaluations of the hazards posed by specified structures. The respondents also called Solem and Associates with the most questions or indicated the most uncertainty with their answers to this section.

3. Structural engineers and architects, as well as the experts in related professions, gave poor ratings for most performance characteristics of three hypothetical buildings using unreinforced masonry:
 - o a two-story commercial store and office, unreinforced masonry, wood floor and roof, built in 1925;
 - o a five-story apartment house, unreinforced masonry walls, steel beams and interior columns, wood floors and roof, built in 1925; and
 - o a twenty-story office building, structural steel frame, unreinforced masonry, built in 1927.
4. The structural engineers and architects also expected damage and poor building performance for several performance characteristics of four additional buildings:
 - o a one-story, industrial or commercial building, tilt-up walls, wood roof, built in 1978;
 - o a thirteen-story office building, reinforced concrete, built in 1970; and
 - o a twenty-story office building, reinforced concrete, curtain walls, built in 1967. (Similar buildings built in 1980 had a significantly better performance rating.)

The overall group tended to perceive potential problems with these buildings as not being particularly severe.

ADEQUACY OF EMERGENCY PRECAUTIONS AND SERVICES

This section of the survey was designed to determine the necessity of selected emergency precautions and services for given types of facilities. Such precautions and services include emergency medicine, emergency response, emergency coordination and other related emergency functions.

1. As in the answers to the section on geologic conditions, the experts in emergency services, response and medicine, and the entire group of experts, generally agreed in their evaluation of the necessity of most emergency services and procedures.
2. The entire group indicated that special design, bracing and anchoring of mechanical and electrical equipment is the most essential precaution or emergency service for nine of the ten facilities listed in the survey.
3. Hospitals, more than any other facility, were felt to require a full range of emergency services and precautions.

4. Many precautions and services were felt to be essential for:
 - o a facility handling toxic or explosive materials;
 - o a telephone facility; and
 - o an energy system (used for electricity or natural gas distribution).
5. The entire group felt that several precautions were essential for an office building of eight or more stories. However, it was the only facility which received a higher necessity rating on certain emergency services and safety precautions from the emergency personnel than from the entire group of experts.
6. A moderate amount of emergency capabilities were believed needed for a two-story commercial building and a single-story manufacturing plant.
7. The least amount of on-site emergency capabilities were believed needed for a three-story apartment building and a single family home.

SOURCES OF HAZARD INFORMATION

The responses to the open-ended questions on the source of the information used in answering the surveys were revealing. Most of the soil and foundation engineers and geologists cited published literature or a combination of literature and experience as sources for their responses while only a few cited personal opinion, experience or particular earthquake events. On the other hand, the structural engineers and architects tended to cite experience and opinion, rather than published data. As noted previously, tort liability will depend in part on whether a "reasonable person" would have acted on available knowledge regarding earthquake hazards and earthquake hazard mitigation measures to reduce the risk of harm or damage in a given situation. Knowledge based on personal experience or opinion of experts in specialized fields will probably be less supportive of findings of tort liability since that "knowledge" may be (1) less accessible to the average "reasonable person," and (2) less certain.

A NOTE ON THE RESPONSES OF THE INSURANCE AND FINANCE EXPERTS

The surveys were mailed to a number of experts in the fields of insurance and finance to determine the extent to which earthquake hazard knowledge is available to those not directly involved in earthquake hazard studies or disaster response. The response rate of this group was much lower than the overall sample. Many not responding cited their lack of expertise in this area. However, for most questions, those who participated responded in much the same manner as the remainder of the experts.

SURVEY METHOD

ABAG staff, Solem and Associates, and H.J. Degenkolb developed the survey. It was reviewed and revised by selected Review Committee members.

The sample for the survey was provided by ABAG staff, Solem and Associates, and H.J. Degenkolb. It included experts in geology, soil and foundation engineering, structural engineering, architecture, emergency services, emergency medicine, emergency response, finance and insurance.

On January 17, 1983 a total of 81 questionnaires were mailed. Two, and in some cases three, rounds of telephone calls to remind and encourage survey participants to return the surveys were made by Solem and Associates staff in the weeks after the mailing. By March 15, 58 percent of the questionnaires had been returned and the survey was closed.

The response rates by profession follow in Table 1.

TABLE 1: SURVEY RESPONSE RATES

Profession	Number Returned/Mailed	Response Rate
Geologists	10/13	77%
Soil and Foundation Engineers	5/6	83%
Structural Engineers	7/13	54%
Architects	3/6	50%
Emergency Services Specialists	17/25	68%
Insurance/Finance Experts	6/18	33%
OVERALL	47/81	58%

The sample was not scientifically drawn nor was it large enough to allow for a sophisticated statistical analysis. The experts were selected for their expertise and interest in earthquake hazards. Thus, the observations made in this report are not definitive. However, the respondents are acknowledged experts in their various fields and the results do provide a strong "temperature reading" of the knowledge and attitudes of those professionally involved with earthquake hazards. The data suggest a general consensus on knowledge of such hazards, which helps define private sector liability in California.

GEOLOGIC CONDITIONS

The section on geologic conditions had three major questions. In the first and second questions, the experts rated the probability of substantial property damage. A variety of scenarios assumed that a magnitude 7 plus earthquake has occurred on an identified fault. The scale used for rating the probability of substantial property damage was:

- 1 = definitely will occur
- 2 = probably will occur
- 3 = probably will not occur
- 4 = definitely will not occur

In the first question, experts rated a one-story wood frame structure in various geologic settings (see Table 2). Such a structure located on a known active trace of the San Andreas fault had the greatest probability of substantial property damage (mean response = 1.7). Other problem locations for such a structure included an area of Bay mud in the vicinity of San Francisco Bay (m.r. = 2.0), a site corresponding to an active fault trace shown on a map issued by the California State Geologist pursuant to the Alquist-Priolo Special Studies Zones Act (m.r.=2.0), and 100 feet from a major active fault on typical alluvial materials (m.r.=2.1). The location where significant property damage is least likely to occur for such structures is 100 miles from a major active fault on typical alluvial materials (valley soil).

Responses indicated the experts believed in:

- o a gradual decrease in damage with distance from the fault on the same kind of soil;
- o a decrease in damage from liquefaction with distance from the fault resulting in greater damage than from ground shaking; and
- o less damage in hillsides on bedrock than on valley soil (unless the area had been subject to landsliding in the past).

The soil and foundation engineers and geologists noted these same relationships. However, compared to the overall group, they indicated: (1) a greater probability of damage on or adjacent to the fault than at large distances; and, (2) lower probability of damage due to dam failure, tsunamis, or landsliding. All responses, ranked in order of locations where damage was perceived most likely to occur to where it was perceived least likely to occur are shown on Table 2.

In the second question, when asked to rate the probability of substantial property damage occurring to a flexible eight-story concrete and steel structure, the experts again note that proximity to the fault is a major determining factor. Damage is also considered more probable than with a wood frame building. The results are shown on Table 3.

Third, all the experts were asked to rank the probability of an earthquake of magnitude 6 or more occurring on the San Andreas fault within the next ten years in three different locations: the San Francisco area, the central California coastal area, and the Los Angeles area. The experts ranked the Los Angeles area as that where such an earthquake was most likely to occur. The overall sample ranked the San Francisco area second, while the soil and foundation engineers and geologists ranked the central coast area second (see Table 4).

TABLE 2: LIKELIHOOD OF SUBSTANTIAL PROPERTY DAMAGE OCCURRING TO A ONE-STORY WOOD FRAME STRUCTURE IN THE EVENT OF A 7+ EARTHQUAKE AT VARYING LOCATIONS (Scale: 1=definitely will occur to 4=definitely will not occur)

Location	Mean Response	
	Overall	Soils & Foundation Engineers and Geologists
On a known active trace of the San Andreas Fault	1.7	1.5
On a site corresponding to an active fault trace shown on a map issued by the California State Geologist pursuant to the Alquist-Priolo Special Studies Zones Act	2.0	1.9
In an Area of Bay mud in the vicinity of San Francisco Bay	2.0	2.0
100 feet from a major active fault on typical alluvial materials (valley soil)	2.1	2.0
On loose well-graded, water-saturated sand in an area ten miles from a major active fault	2.4	2.3
One mile from a major active fault on typical alluvial materials (valley soil)	2.4	2.5
In the inundation area of a dam	2.4	2.7
On a hillside with topographic features indicative of past, but not recent, landslides ten miles from a major active fault	2.5	2.8
On the coast in an area identified as being subject to a 500-year tsunami (tidal wave)	2.7	2.8
Ten miles from a major active fault on typical alluvial materials (valley soil)	3.0	3.2
On bedrock on a hillside with no history of major landslides ten miles from a major active fault	3.3	3.4
On loose well-graded, water-saturated sand in an area 100 miles from a major active fault	3.3	3.4
100 miles from a major active fault on typical alluvial materials (valley soil)	3.5	3.6

TABLE 3: LIKELIHOOD OF SUBSTANTIAL PROPERTY DAMAGE OCCURRING TO A FLEXIBLE EIGHT-STORY CONCRETE AND STEEL STRUCTURE IN THE EVENT OF A 7+ EARTHQUAKE ON ALLUVIAL MATERIALS AT VARYING DISTANCES FROM A MAJOR ACTIVE FAULT (Scale: same as Table 2)

Location	Overall	Mean Response
		Soils & Foundation Engineers and Geologists
One mile from a major active fault	2.0	2.1
Ten miles from a major active fault	2.7	2.8
One hundred miles from a major active fault	3.2	3.5

TABLE 4: LIKELIHOOD OF AN EARTHQUAKE OF MAGNITUDE 6 OR MORE WITHIN THE NEXT TEN YEARS BY LOCATION (Scale: same as Tables 2 and 3)

Location	Overall	Mean Response
		Soils & Foundation Engineers and Geologists
In the Los Angeles Area	2.0	2.2
In the San Francisco Area	2.3	2.5
In the Central Coast	2.4	2.4

Finally, the soil and foundation engineers and the geologists were asked a series of open-ended questions. The first three questions dealt with ground shaking. Those geologic conditions believed to contribute most to ground shaking damage (with the number of times mentioned listed in parentheses) included:

- o foundation soil conditions, including materials with limited cohesion or which are soft, loose, saturated, fine-grained, or thick (8);
- o ground failure, including settlement, liquefaction and landsliding (4);
- o proximity to the fault (3); and
- o characteristics of the earthquake event, including magnitude, acceleration, duration and amplitude (3).

Next, these professionals were asked to list the references or experiences on which they based their opinions:

- o historic earthquakes, reports on those earthquakes and specific investigations and studies (8);
- o a combination of personal experience and literature (2); and
- o personal experience or opinion without citing studies or specific earthquakes (2).

The high incidence of citing published material and selected earthquakes can be important to establishing the legal basis for liability because it is usually stronger evidence of: (1) "knowledge;" and, (2) the availability and dissemination of such knowledge.

Reasonable precautions recommended for mitigating ground shaking damage included:

- o careful or proper design of the structure, including special bracing or adherence to building codes (7);
- o appropriate construction and land use restrictions (4);
- o design of the foundation to be compatible with the foundation materials and conditions, including alteration or bypassing of problem foundation conditions (3);
- o site evaluation (3); and
- o governmental inspections (1).

The final three open-ended questions in this section dealt with liquefaction. Those conditions which must be present for liquefaction to occur listed by the geologists and the soil and foundation engineers included:

- o liquefiable materials (sands or silty sands) (11);
- o low consolidation (10);
- o high ground water or material saturation (10); and
- o ground shaking; including vibrations or several cycles of high accelerations (4).

Next, these professionals were asked to list the references or experiences on which they based their opinions including:

- o reports or contacts with Seed, Youd and other experts, or descriptions of earthquake damage and specific investigations (10); and
- o general knowledge or applied knowledge or applied knowledge without citing specific reports or studies (2).

Again, such consistency may be valuable in establishing when hazard knowledge is sufficient to form a legal basis for liability if it is ignored.

Reasonable precautions recommended for mitigating liquefaction damage included:

- o alteration or bypassing of foundation materials through densification, dewatering, mat footings or pile foundations (9);
- o land use restrictions, including avoiding liquefiable soils for most uses, avoiding these areas for major utility lines, or taking specific precautions in these areas, such as constructing redundant utility lines (4); and
- o hazard evaluation studies (1).

STRUCTURAL CONDITIONS

All those surveyed were asked to rate the relative performance of seventeen hypothetical buildings in the event of a magnitude 7 plus earthquake on a fault 10 miles away. An earthquake of this size was chosen because of the likelihood of significant damage occurring to buildings over a fairly large area. Buildings were defined by type of design, use, and date of construction. The seven performance characteristics rated were:

- o hazard to occupants from building collapse;
- o hazard to bystanders outside;
- o damage to contents;
- o loss of function of building;
- o damage to architectural portions of building (non-structural);
- o structural damage; and
- o hazards from falling objects.

The scale used in rating performance was from 1 to 5. (1) indicated excellent performance, minimal damage, maximum protection. (5) indicated little or no protection, maximum damage. The responses for three groups of experts--the structural engineers, the structural engineers and architects combined, and the overall sample--are shown in Table 5.

In comparing the responses for the overall performance of different buildings, the following observations are apparent.

1. The structural engineers and architects rated the older two-story home as better than the newer split-level home for loss of building function, architectural damage, structural damage, and falling objects. The overall sample rated the newer building as better.
2. The overall group rated the two-story reinforced concrete office built in 1955 better than the unreinforced masonry store and office built in 1925 for all performance characteristics.
3. The overall group rated a public grammar school (subject to the Field Act standards) better than a private grammar school for all performance characteristics. However, in the case of the structural engineers and architects, the difference in the ratings of public schools and private schools was three times as great as the difference in the ratings given such schools by the overall group.
4. The overall group rated the thirteen-story reinforced concrete apartment house built in 1955 better than the five-story apartment house built in 1925 for all performance characteristics.

5. They also rated the shopping center built in 1970 better than or equal to the tilt-up concrete building built in 1978 for all performance characteristics.
6. While the structural engineers rated the reinforced concrete office building built in 1970 worse overall than the reinforced concrete apartment building built in 1955, the entire group rated the newer building as a better performer. The structural engineers and architects also rated both buildings as having significantly poorer performance than the entire group of professionals.
7. Of the three twenty-story structural steel-frame buildings, the group rated the one with unreinforced masonry built in 1927 as the poorest performer. The structural engineers noted poorer performance by the structural steel moment frame and curtain wall office building built in 1970 than by the older structural steel frame and concrete walls office building built in 1960 for most performance characteristics. The overall group ranked the newer building as being a better performer, however.
8. While the experts as a whole ranked the three twenty-story reinforced concrete office buildings as improving in performance with the newer buildings for most performance characteristics, the structural engineers rated the one with curtain walls built in 1967 as the worst for most performance characteristics.

Several observations also can be made by looking at the entire group of buildings with respect to each of the performance characteristics. This survey analysis assumes a rating of 2.1 or less as indicating few problems or a small hazard, and 3.4 or greater as indicating significant problems for given performance characteristics.

1. With respect to hazards to occupants from building collapse, the structural engineers and architects, as well as the overall group, saw relatively few problems with six buildings:
 - o the two single-family homes;
 - o the public grammar school;
 - o a twenty-story structural steel frame, concrete wall office building built in 1960;
 - o a twenty-story structural steel moment frame, curtain wall office building built in 1970; and
 - o a twenty-story reinforced concrete, curtain wall office building built in 1980.

However, significant hazards to occupants from building collapse were noted for the two-story and five-story buildings built using unreinforced masonry.

The structural engineers and architects also noted a significant problem with building collapse for the twenty-story reinforced concrete curtain wall office building built in 1967.

2. Generally, ratings of buildings for hazards to bystanders outside were similar to ratings for hazards to occupants. However, the twenty-story structural steel frame, unreinforced masonry office building also posed significant problems to bystanders according to the survey group as a whole. In addition, both twenty-story structural steel moment frame, curtain wall office buildings were rated as posing significant hazards to bystanders by the structural engineers and architects.
3. The structural engineers and architects gave poorer ratings for damage to contents than to bystanders outside for six of the one- to two-story buildings, including:
 - o the two single family homes;
 - o the two-story reinforced concrete, wood floor and roof office building built in 1955;
 - o both grammar schools; and
 - o the one- and two-story large shopping center.
4. For virtually all of the buildings, the structural engineers and architects gave roughly equal ratings for damage to contents and damage to architectural features. Ratings for loss of function of the building were slightly worse or equal. The ratings of the entire group had the same trend. However, for three of the buildings, the structural engineers and architects gave worse ratings for loss of building function:
 - o both the two-story and the five-story buildings constructed with unreinforced masonry; and
 - o the one-story, tilt-up walls building.

In all three cases, the ratings of the entire group did not reflect this trend.

5. The structural engineers and architects rated structural damage performance as poor for five buildings:
 - o the two- and five-story buildings constructed with unreinforced masonry;
 - o the thirteen-story reinforced concrete apartment house built in 1955;
 - o the one-story building with tilt-up walls; and
 - o the twenty-story reinforced concrete, curtain wall office building built in 1967.

The group of experts as a whole only tended to rate the two buildings using unreinforced masonry as poor performers. However, they also gave poor ratings for structural performance to the twenty-story structural steel frame, unreinforced masonry office building built in 1927 which were not so rated by the structural engineers.

6. Finally, the structural engineers and architects rated hazards from falling objects in seven buildings as significant:
 - o the two-, five-, and twenty-story buildings constructed with unreinforced masonry;
 - o the twenty-story structural steel frame, curtain wall office building built in 1970;
 - o the twenty-story reinforced concrete frame, concrete walls office building built in 1955; and
 - o both twenty-story reinforced concrete, curtain wall office buildings.

Although the entire group tended to rate the three buildings constructed of unreinforced masonry as poor performers, they did not rate the four additional twenty-story office buildings as poor performers.

TABLE 5: RELATIVE PERFORMANCE RANKING (MEAN RESPONSE) FOR SELECTED BUILDINGS AND PERFORMANCE CHARACTERISTICS IN A MAGNITUDE 7 PLUS EARTHQUAKE ON A FAULT 10 MILES AWAY (Scale: 1=excellent performance, minimal damage, maximum protection; 5=little or no protection, maximum damage)

Building Characteristics		Performance Characteristics						
		Hazard to occupants from building collapse	Hazard to bystanders outside	Damage to contents	Loss of function of building	Damage to architectural portions of building (non-structural)	Structural damage	Hazards from falling objects
a. Single family (Structural Engineers)		1.6	1.9	2.9	2.1	2.7	2.0	2.4
two-story light (S.E. and Architects)		1.6	1.7	2.7	2.1	2.5	1.9	2.3
wood frame, (Overall)		2.0	1.8	2.7	2.2	2.6	2.2	2.4
built in 1925								
b. Single family split-level (S.E.)		2.0	1.9	2.7	2.6	3.0	2.9	2.9
light wood frame, built in (S.E.+A)		1.9	1.9	2.7	2.4	2.8	2.7	2.9
1970 (All)		1.8	1.7	2.6	2.2	2.4	2.3	2.2
c. Two-story unreinforced masonry, (S.E.)		4.7	4.9	4.6	4.9	4.7	4.9	4.7
wood floor and roof, commercial (S.E.+A)		4.7	4.8	4.6	4.8	4.7	4.8	4.7
store and office built in 1925 (All)		4.1	4.1	4.1	4.2	4.3	4.2	4.2
d. Two-story reinforced concrete, (S.E.)		2.7	2.1	3.3	3.3	3.3	3.1	2.7
wood floor and roof office (S.E.+A)		2.8	2.3	3.2	3.1	3.2	3.1	2.8
building built in 1955 (All)		2.4	2.2	2.8	2.6	2.7	2.7	2.5
e. Public grammar school (S.E.)		1.1	1.1	2.1	1.7	2.1	1.4	1.7
built in 1950 (S.E.+A)		1.3	1.3	2.2	1.8	2.2	1.6	2.0
(All)		1.9	1.8	2.6	2.1	2.5	2.1	2.3
f. Private grammar school (S.E.)		2.3	2.3	3.4	3.0	3.6	3.1	3.1
built in 1955 (S.E.+A)		2.4	2.4	3.4	3.0	3.6	3.1	3.2
(All)		2.4	2.2	3.0	2.5	2.9	2.6	2.7
g. Five-story apartment house, (S.E.)		4.1	4.3	4.4	4.9	4.6	4.6	4.3
unreinforced masonry walls, (S.E.+A)		4.1	4.2	4.3	4.7	4.6	4.4	4.3
steel beams and interior columns, (All)		3.9	4.1	4.1	4.2	4.3	4.2	4.2
wood floors and roof built in 1925								
h. Thirteen-story reinforced (S.E.)		3.0	3.0	3.3	3.3	3.3	3.6	2.7
concrete apartment house (S.E.+A)		3.1	3.2	3.4	3.4	3.3	3.6	3.0
built in 1955 (All)		2.6	3.0	3.2	3.0	3.3	3.1	3.1
i. One-story, tilt-up walls wood (S.E.)		2.9	2.9	3.0	3.6	3.1	3.6	2.9
roof industrial or commercial (S.E.+A)		3.2	3.2	3.3	3.8	3.4	3.8	3.2
building built in 1978 (All)		3.1	2.7	3.2	3.1	3.1	3.2	2.9

TABLE 5: RELATIVE PERFORMANCE RANKING (MEAN RESPONSE) FOR SELECTED BUILDINGS
(Continued)

Building Characteristics			Performance Characteristics					
			Hazard to occupants from building collapse	Hazard to bystanders outside	Damage to contents	Loss of function of building	Damage to architectural portions of building (non-structural)	Structural damage Hazards from falling objects
j. Thirteen-story reinforced concrete office building built in 1970	(S.E.) (S.E.+A) (All)	3.2 3.1 2.2	3.0 3.0 2.6	3.6 3.6 3.0	3.6 3.6 2.7	3.7 3.7 3.0	3.3 3.3 2.6	3.0 3.1 2.9
k. Twenty-story structural steel frame, unreinforced masonry office building built in 1927	(S.E.) (S.E.+A) (All)	2.6 2.8 3.2	3.7 3.9 3.9	3.4 3.6 3.7	3.0 3.2 3.6	3.9 3.9 4.0	3.0 3.2 3.6	3.7 3.8 4.0
l. Twenty-story structural steel frame, concrete walls office building built in 1960	(S.E.) (S.E.+A) (All)	1.6 1.7 2.1	2.4 2.6 2.7	2.6 2.6 2.8	1.9 2.0 2.4	2.7 2.7 2.9	2.3 2.3 2.5	2.4 2.6 2.9
m. Twenty-story structural steel moment frame, curtain wall office building built in 1970	(S.E.) (S.E.+A) (All)	1.4 1.4 1.9	3.1 3.0 2.7	3.0 2.9 2.7	2.0 2.0 2.3	3.4 3.2 2.9	1.7 1.8 2.2	3.6 3.4 3.0
n. Twenty-story reinforced concrete frame, concrete walls office building built in 1955	(S.E.) (S.E.+A) (All)	2.9 2.8 2.5	2.6 2.7 2.8	3.1 3.2 3.0	3.3 3.2 2.9	2.9 2.9 3.1	3.6 3.3 3.0	3.9 3.8 3.2
o. Twenty-story reinforced concrete curtain walls office building built in 1967	(S.E.) (S.E.+A) (All)	3.4 3.3 2.6	3.6 3.3 2.7	3.4 3.3 3.0	3.4 3.2 2.8	3.4 3.4 3.0	3.9 3.7 2.8	3.9 3.7 3.1
p. Twenty-story reinforced concrete curtain walls office building built in 1980	(S.E.) (S.E.+A) (All)	1.7 1.8 1.9	3.5 3.3 2.6	2.6 2.6 2.6	2.6 2.4 2.4	2.9 2.7 2.7	2.7 2.6 2.3	4.0 3.7 2.9
q. One and two-story large shopping center built in 1970	(S.E.) (S.E.+A) (All)	2.7 2.6 2.4	2.7 2.7 2.5	3.6 3.4 3.0	3.0 2.9 2.5	3.7 3.6 3.1	2.9 2.8 2.5	3.0 3.1 2.9

Next, the structural engineers and architects were asked two open-ended questions. First, they were asked why a particular building of their choice was a poor performer. They cited the following:

- o the building wouldn't meet current code standards (1);
- o past earthquakes (2);
- o a combination of experience and past earthquakes (1);
- o "an educated guess" (1); and
- o experience, past earthquakes, and problems with specific design details (1).

Only the expert mentioning the code could be thought of as citing specific literature. Citations of earthquakes and specific design details could indicate reports. However, the apparent lack of published material supporting expert opinions may make it more difficult to establish that knowledge of a hazard is sufficient to form a legal basis for liability. Secondly, the lack of well-known reports or documents in this area may explain why many building problems recognized by structural engineers and architects in the previous table were not noted by the others.

When asked what would be reasonable precautions to mitigate these hazards, six of the eight respondents suggested specific structural retrofitting work. Two of the six mentioned tearing the building down as a possibility. One of the six mentioned upgrading the building to "1/2 code" as a option. One of the remaining respondents cited the need for inspection the of building. The second remaining respondent, having chosen a building built to current code specifications, focused on third party review, checking of plans, and better engineering.

Finally, the structural engineers and architects were asked whether they agreed or disagreed with 14 statements. The experts responded as shown in Table 6. The responses were completely consistent for five of the statements. The responses were largely consistent for seven of the statements. For the remaining two, dealing with buildings that are on an earthquake-causing fault and with bridge abutments, the responses were mixed.

TABLE 6: RESPONSES TO STATEMENTS ON STRUCTURAL PERFORMANCE MADE BY
STRUCTURAL ENGINEERS AND ARCHITECTS

<u>Statement</u>	<u># Noting Agreement</u>	<u># Noting Disagreement</u>
a. Light wood framed structures perform better on rock foundations than they do on soft alluvium.	10	0
b. Unreinforced masonry buildings with wood floors and roofs suffer more damage on rock foundations than they do on soft alluvium.	2	7
c. In a big earthquake, low stiff buildings suffer more damage at a distance of 60 miles from the fault than do tall flexible buildings at the same distance.	1	8
d. Uniformly graded loose sand with a high water table tends to liquefy during strong earthquake motions.	10	0
e. One-story reinforced masonry or concrete walled rigid buildings perform better on rock foundations than on soft alluvium.	2	7
f. Buildings on piles perform more poorly than buildings on spread footings when foundations liquefy.	2	8
g. The tendency of sands to liquefy cannot be reduced by densification, drainage or grouting.	2	8
h. It is not necessary to provide ductile details when reinforcing the tops of precast, pre-stressed piles.	0	10
i. Prestressing tendons qualify as ductile steel for concrete ductile moment frames.	0	10
j. Buildings that are astride an earthquake-causing fault always fail.	5	5
k. Bridge abutments usually spread during an earthquake.	4	5
l. Redundancy is detrimental to the performance of a building in earthquakes.	0	10
m. A design that permits the foundation to move with little resistance between it and the 2nd floor does not protect the building above the 2nd floor.	8	1
n. The addition of strength in certain but not all floors can reduce the ability of the building to resist earthquakes.	8	2

EMERGENCY SERVICES

In the section on emergency services, all those surveyed were asked to indicate the degree to which they felt that specified precautions or services were needed for different facilities to prepare for a moderately large earthquake, that is, one similar to the magnitude 6.4 San Fernando earthquake in 1971. The scale used in rating the degree of necessity was:

- 1 = should be required
- 2 = probably needed
- 3 = probably not needed
- 4 = definitely not needed

The facilities or buildings for which the precautions or services were rated were:

- o an office building of eight stories or more;
- o a three-story apartment building;
- o a single family home;
- o a two-story commercial building;
- o a single-story manufacturing plant;
- o a hospital;
- o a facility handling toxic or explosive materials;
- o a radio or television studio or transmission facility;
- o a telephone facility; and
- o an energy system (used for electricity or natural gas distribution).

The precautions and services examined included:

- o special design, bracing and anchoring of mechanical and electrical equipment;
- o back-up power capability;
- o on-site staff with special training in first aid and fire control;
- o facility manager participation in earthquake safety drills held by the local government;
- o emergency evacuation plans and drills involving building/facility occupants;
- o three to four day supply of food and water for occupants; and
- o first aid supplies.

The response for the emergency services, emergency response and emergency medicine professionals, and for the overall sample are shown in Table 7. In a follow-up question, respondents were asked to indicate the ONE item they felt was most needed. In analyzing these responses, several observations can be made.

1. In comparison to the overall group, the emergency experts tended to view emergency precautions and services as slightly more essential.
2. Special design, bracing and anchoring of mechanical and electrical equipment was ranked as the most essential precaution or emergency service for most buildings or facilities. For all but two of the buildings--the three-story apartment building and the single family home--most survey participants felt that such precautions should be required.
3. A majority of the respondents rated back-up power capability (or redundancy in system design for the energy system) as so essential that it should be required for:
 - o hospitals;
 - o facilities handling toxic or explosive materials;
 - o radio or television studios and transmission facilities;
 - o telephone facilities; and
 - o energy systems.
4. A majority of the respondents rated special training in first aid and fire control, participation in earthquake safety drills held by the local governments, and emergency evacuation plans and drills as so essential that they should be required for:
 - o hospitals;
 - o facilities handling toxic or explosive materials;
 - o telephone facilities; and
 - o energy systems.
5. A three to four day supply of food and drinking water was rated as the least important precaution in most cases. Only in the case of a hospital was this precaution viewed by a majority of the experts as so important that it should be required.
6. For an office building of eight stories or more, special design, bracing and anchoring of mechanical and electrical equipment was noted as the most needed precaution by most of the survey participants (51%), with emergency evacuation plans and drills involving building occupants a close second (40%). The emergency experts reversed this order with 53% listing the evacuation plan and drills as most needed and 47% listing the equipment precautions as most needed.
7. For a three-story apartment building, special design, bracing and anchoring of mechanical and electrical equipment was noted as most needed by 47% of both the overall group and the emergency experts. Again, more emergency services experts than the overall group felt that emergency evacuation plans and drills involving building occupants were most needed (40% vs. 26%).

8. For a single family home, responses regarding the most needed precaution were split among special anchoring of equipment (21% of the emergency experts and 31% overall), expertise in first aid/first aid supplies (36% of the emergency experts and 24% overall), and a three to four day supply of food and drinking water (21% of the emergency experts and 31% overall).
9. For a two-story commercial building, special design, bracing and anchoring of mechanical and electrical equipment was again chosen as the most needed precaution (47% of the emergency experts and 50% overall). An emergency evacuation plan and drills involving building occupants were viewed as most important by 27% of the emergency experts and by 20% of the overall group.
10. For a single-story manufacturing plant, special design, bracing and anchoring of mechanical and electrical equipment was chosen as the most needed (50% of the emergency experts and 55% overall). On-site staff with special training in first aid and fire control was viewed as most important by 21% of both the emergency experts and the overall group.
11. For a hospital, responses to the question on the most needed precaution were split among special design, bracing and anchoring of mechanical and electrical equipment (36% of the emergency experts and 43% overall), back-up power capability (21% of the emergency experts and 20% overall), and an emergency evacuation plan and drills involving building staff (36% of the emergency experts and 25% overall).
12. For a facility handling toxic or explosive materials, responses on the most needed precaution were split among special design, bracing and anchoring of all equipment (50% of the emergency experts and 55% overall), on-site staff with special training in first aid and fire control (21% of the emergency experts and 23% overall), and an emergency evacuation plan and drills involving facility occupants (29% of the emergency experts and 15% overall).
13. For a radio or television studio and transmission facility, responses on the most needed precaution were split among special design, bracing and anchoring of mechanical and electrical equipment (53% of the emergency experts and 54% overall), back-up power capability (27% of the emergency experts and 32% overall), and an emergency plan and drills involving facility occupants (20% of the emergency experts and 15% overall).
14. For a telephone facility, responses on the most needed precaution were split among special design, bracing and anchoring of mechanical and electrical equipment (60% of the emergency experts and 55% overall), back-up power capability (20% of the emergency experts and 24% overall), and an emergency disaster plan and drills involving facility occupants (20% of the emergency experts and 10% overall).

15. Finally, for an energy system (used for electricity or natural gas distribution), responses on the most needed precaution were split among special design, bracing and anchoring of mechanical and electrical equipment (62% of the emergency experts and 64% overall), redundancy in facility system design (7% of the emergency experts and 15% overall), and an emergency evacuation plan and drills involving facility staff (31% of the emergency experts and 10% overall).

TABLE 7: DEGREE OF NECESSITY RANKING (MEAN RESPONSE) FOR SELECTED PRECAUTIONS AND SERVICES IN A MODERATELY LARGE EARTHQUAKE SIMILAR IN SIZE TO THAT OF SAN FERNANDO (Scale: 1=should be required; 2=probably needed; 3=probably not needed; 4=definitely not needed)

Building/Facility			Special design, bracing and anchoring of mechanical and electrical equipment(1)	Back-up power capability(2)	On-site staff with special training in first aid and fire control(3)	Facility manager participation in earthquake safety drills held by the local government(4)	Emergency evacuation plans and drills involving building/facility occupants(5)	Three to four day supply of food and water for occupants(6)	First aid supplies(7)
a.	Office building (Emergency Experts) of eight stories or more (Overall)		1.3 1.3	1.6 1.7	1.3 1.7	1.5 1.7	1.4 1.6	1.9 2.5	-- --
b.	Three-story apartment building	(Emer.) (A11)	1.6 1.6	2.5 2.6	2.2 2.5	2.4 2.4	1.8 2.1	2.4 2.4	2.1 2.0
c.	Single family home	(Emer.) (A11)	1.7 1.7	1.7 1.6	1.8/1.9 1.9/2.0	-- --	2.0 2.1	1.8 1.8	-- --
d.	Two-story commercial building	(Emer.) (A11)	1.4 1.4	2.3 2.4	2.0 2.1	2.1 2.2	1.8 2.0	2.4 2.7	-- --
e.	Single-story manufacturing plant	(Emer.) (A11)	1.3 1.4	1.9 2.1	1.5 1.6	2.1 1.9	1.6 1.8	2.3 2.6	-- --
f.	Hospital	(Emer.) (A11)	1.1 1.1	1.1 1.1	1.1 1.2	1.2 1.2	1.1 1.1	1.2 1.2	-- --
g.	Facility handling toxic or explosive materials	(Emer.) (A11)	1.1 1.1	1.3 1.4	1.1 1.1	1.3 1.3	1.1 1.2	2.3 2.5	-- --
h.	Radio or television studio and transmission facility	(Emer.) (A11)	1.2 1.2	1.2 1.2	1.6 1.7	1.8 1.7	1.5 1.6	1.9 2.0	-- --
i.	Telephone facility	(Emer.) (A11)	1.1 1.1	1.1 1.1	1.3 1.3	1.6 1.4	1.1 1.3	1.9 2.0	-- --
j.	Energy system (used for electricity or natural gas distribution)	(Emer.) (A11)	1.1 1.1	1.3 1.3	1.1 1.2	1.5 1.4	1.2 1.3	1.9 2.0	-- --

Notes for Table 7:

- (1) o Rephrased as "Special anchoring of equipment (furnace, water heater, large furnishings)" for a single family home.
 - o Rephrased as "Special design, bracing and anchoring of all equipment" for a facility handling toxic or explosive material.
- (2) o Rephrased as "Back-up power (camp stove, flashlights, extra batteries)" for a single family home.
 - o Rephrased as "Redundancy in facility system design" for an energy system.
- (3) o Split into two questions for a single family home - "Expertise in first aid/first aid supplies" and "Expertise in fire control (fire extinguisher/alarms)".
 - o Replaced by "On-site staff with special training in fire control" for a hospital.
- (4) o Eliminated for a single family home.
 - o Rephrased as "Facility staff participation..." for a hospital, for a radio or television studio and transmission facility, for a telephone facility, and for an energy system.
- (5) o Rephrased as "Emergency evacuation plan" for a single family home.
 - o Rephrased as "...involving building staff" for a hospital and for an energy system.
- (6) o Rephrased without "...for occupants" for a three-story apartment building and for a single family home.
- (7) o Listed as a separate item only for a three-story apartment building.

Finally, the emergency experts were asked to list references or experiences they used to respond to the questions on necessary emergency services. They cited:

- o past schooling or experience and written pamphlets or reports (3);
- o written reports (1); and
- o past schooling or experience (4).

The remainder of these experts either did not answer or focused on the technical rationale for specific responses.

Thus, roughly half of the experts responding to this question in a manner which can be analyzed noted specific literature. The occurrence of references to written materials was less than that of the geologists and soils and foundation engineers but much greater than that of the structural engineers and architects.

BACKGROUND RESEARCH REPORT 3

TORT LIABILITY OF PRIVATE BUSINESSES AND INDUSTRIES FOR EARTHQUAKE HAZARDS AND LOSSES--

A Review of Current California Law

August 1983

Association of Bay Area Governments

CREDITS

Legal Research:

Gary Schwartz, Professor of Law; University of California,
Los Angeles

Staff:

Jeanne Perkins, Earthquake Preparedness Program Manager and
Project Principal Investigator; ABAG

Douglas Detling, Legislative Affairs Officer; ABAG
Richard Eggerth, ABAG Associate Legal Counsel; Benner, Harris and Moy
Kenneth Moy, ABAG Legal Counsel; Benner, Harris and Moy

Project Review Committee:

Rod Diridon (Chairman) - Santa Clara County Supervisor
Stanley Scott (Vice-Chairman) - California State Seismic Safety
Commission

Robert D. Brown - Geologist, U.S. Geological Survey
Henry J. Degenkolb - H. J. Degenkolb Associates, Engineers
Peter B. Hawes - Design Professionals Insurance Corporation
John H. Larson - former Los Angeles County Counsel
Bruce D. Oliver - Kaiser Aluminum and Chemical Corporation
H. Roger Pulley - California Office of Emergency Services
Arvo Van Alstyne - State of Utah Commissioner of Education
Charles T. Van Deusen - Pacific Gas and Electric Company

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I. METHODOLOGICAL OVERVIEW

In analyzing a tort problem, it is usually best to begin by ascertaining what the pertinent standard of liability is, and then whether the defendant's conduct entails any departure from or breach of that standard. The negligence standard - so prominent within tort law - is discussed in Part II below.

In general, having identified some element of tortiousness in the defendant's conduct, one must then determine whether that conduct is the actual cause, and also the so-called "proximate cause," of the plaintiff's injury. The doctrine of proximate cause can easily become quite esoteric; fortunately, almost all of the specific hypotheticals below are free of proximate cause complications. However, the issue of actual cause (or "but-for cause") seems implicit in a number of these hypotheticals. Actual causation is dealt with briefly in Part II-B below.

Within tort, there is a variety of doctrines that can be referred to in a number of ways: "limitations on liability," "no-duty rules," "affirmative defenses," "special situations." One can argue almost endlessly--and not very profitably--about how particular doctrines should be subsumed or classified. Several doctrines of this sort--doctrines that recur in the specific hypotheticals--are dealt with in Part II-C through Part II-H below.

Workers' compensation is a special case; indeed, most would classify it as something other-than-tort. It is a combination of a compensation program and a strict liability rule, and it is lacking in most of the "affirmative defenses" (and so on) that characterize the law of torts. Two issues that recur when workers' compensation is applied to earthquake situations are dealt with at the close of Part II below.

II. GENERAL DOCTRINES

A. THE NEGLIGENCE STANDARD

Negligence is the underlying standard of liability applicable to most of the specific hypotheticals discussed below. It is thus important to determine how negligence is defined. Under the Second Restatement of Torts, negligence consists of conduct "which falls below the standard established by law for the protection of others against unreasonable risk of harm."¹ Under § 283, "the standard of conduct to which [an actor] must conform to avoid being negligent is that of a reasonable man under like circumstances." Under § 291, a foreseeable risk "is unreasonable and the act [creating that risk] is negligent if the risk is of such magnitude as to outweigh what the law regards as the utility of the act or of the particular manner in which it is done." Under BAJI § 3.10 (the jury instructions prepared for use by California trial judges) "negligence is the doing of something which a reasonably prudent person would not do, or the failure to do something which a reasonably prudent person would do, under circumstances similar to those shown by the evidence. It is the failure to use ordinary or reasonable care."²

Under the California Supreme Court's decision in Weirum v. RKO General, Inc., an act is negligent "only if the risk of harm resulting from the act is deemed unreasonable--i.e., if the gravity and likelihood of the danger outweigh the utility of the conduct involved."³ There is also extensive language describing the negligence standard in the Court's 1966 opinion in Tucker v. Lombardo.⁴ According to the Court, negligence can be defined as "ordinary care under the circumstances." In amplifying this "ordinary care" standard, the Court approved a trial judge's instruction stating that

[i]nasmuch as the amount of caution used by the ordinarily prudent person varies in direct proportion to the danger known to be involved in his undertaking, it follows that in the exercise of ordinary care, the amount of caution will vary in accordance with the nature of the act and surrounding circumstances. To put the matter in another way, the amount of caution involved in the exercise of ordinary care increases or decreases as does the danger that reasonably should be apprehended. [To avoid negligence, a defendant must] exercise a degree of care⁵ commensurate with and in proportion to the danger involved.

It seems, then, that one can identify three approaches to negligence, one of which is concerned with the "reasonable man," the second with "ordinary care," and the third with striking a balance between the foreseeable danger and the expense of avoiding that danger. Fortunately, these three standards tend to blend together: the "reasonable person" is inclined to exercise "ordinary care," and "ordinary care" can itself be measured in terms of a risk-vs.-risk-prevention balance.

B. "ACTUAL CAUSE" OR "BUT-FOR CAUSE"

Determining whether a defendant's negligence is the actual cause of the plaintiff's injury is generally a question of fact for the jury to decide under instructions from the judge: the jury is asked to consider whether, "but for" the defendant's negligence, the plaintiff's injury would have occurred. In several of the specific hypotheticals, however, the possible negligence of the defendant consists of an omission (rather than a positive act). Omissions complicate causation issues. Rather than asking "what happened," one is instead required to ask "what would have happened if"--a question that is often vexingly hypothetical. In a leading "omission" case, the California Supreme Court ruled that the burden of proving the absence of causation shifts to the defendant (the Court reasoning that the lack of direct evidence on the causal issue is after all attributable to the defendant's negligence). See Haft v. Lone Palm Hotel.⁶ However, in a more recent case involving a doctor's failure to disclose the inherent risks of surgery to his patient, the Court has required the plaintiff objectively to prove that a "reasonable person" would have declined surgery if informed of the risks. What the Court's attitude would be toward the causation issue in the various hypotheticals below is therefore somewhat uncertain.

In some cases, moreover, the precautions that a reasonable defendant would adopt might well protect a structure against a moderate earthquake--but not against a severe earthquake (should one occur). The victim of such an "overwhelming" earthquake might therefore be hard-pressed to prove that defendant's failure to implement those precautions was a "but-for cause" of his harm. In City of Pigua v. Morris,⁸ an Ohio case, the defendant owned ponds and negligently allowed those ponds' overflow wickets to become clogged. A flood of unprecedented and extraordinary size then hit the city; the ponds overflowed onto the plaintiff's property. The court found the defendant not liable, reasoning that, given the size of the flood, the overflow would have occurred even if the wickets had been in good condition.

Compare City of Pigua, however, with Kell v. Jansen,⁹ a California Court of Appeal opinion dealing with the relation of a natural disaster to the issue of causation. The defendants were evidently negligent in maintaining its bridge, which then was washed away by a 1940 flood, resulting in damage to the plaintiff's ditch. According to the defendants, even if they were negligent for not having protected the bridge against foreseeable floods, the 1940 flood was altogether "extraordinary" and "would have washed out the bridge anyway"--even had it been properly maintained. Reviewing the record, the Court of Appeal concluded that "there was ample evidence. . . that the negligence of defendants in their operations combined with the unprecedented flood to complete the destruction of plaintiff's . . . ditch."¹⁰ Kell seemingly makes clear the burden of proof in natural disaster cases is a realistic one that plaintiffs are capable of meeting.

C. ACT OF GOD

An earthquake seems to be a good example of what judges call an Act of God. Is there any tort doctrine of Act of God that might detract or limit the scope of negligence liability? One recent law review article, after referring to the February 1971 Sylmar earthquake, flatly states that "past cases involving earthquakes . . . have failed to furnish an adequate [tort] remedy primarily because earthquakes have achieved the formidable legal status of an 'act of god.'"¹¹ However, of the four cases cited by the article to document this statement, none is a pure negligence personal-injury case. One is an insurance case, the second a California workers' compensation case (to be discussed below). The third is Finch v. McKee,¹² in which the defendant, in selling the plaintiff a building, had stated that the building was "earthquake proof;" the building then collapsed during the 1933 Long Beach earthquake. The plaintiff sued for the lost value of the building, relying on the somewhat special tort of misrepresentation. The California Court of Appeal denied a recovery, on grounds of its conclusion that the seller's statement was a mere expression of opinion rather than a representation of fact.

The mere statement that the building in question was constructed earthquake proof is a matter of pure speculation or prophecy. Every person of common understanding knows it is impossible to estimate the

destructive forces of nature accompanying earthquakes, tornados, cyclones, storms, or floods. No human being could have prophesied . . . the damages which resulted to the structures in Long Beach and that vicinity from the earthquake of 1933. Such statements were pure speculations upon which no purchaser had a right to rely.¹³

It is quite likely that the general legal distinction between "fact" and "opinion" has shifted in the 37 years since Finch. Moreover, new forms of information may themselves make statements like "earthquake-proof" more nearly "factual" today than they were in 1933. As a result of this, it may well be that the plaintiff in a Finch-like situation could today secure a recovery. Since none of the hypotheticals involve a problem of misrepresentation, however, this is a possibility not fully researched for this report.

The final case cited by the law review article is from South Carolina, Slater v. South Carolina Ry.¹⁴ In Slater, the plaintiff had entrusted his horses and mules to the care of the railroad, a "common carrier." An earthquake proceeded to rupture a pond, thereby creating a flood which washed away part of the railroad track. This resulted in the derailment of a later railroad car, and the consequent destruction of plaintiff's property. As the Slater court recognized, the common law renders a common carrier strictly liable for all damage to property entrusted to it, unless that damage is "caused by an act of God, or [by] the public enemies." According to the Court, if an act of God is the "sole cause" of the damage, the common carrier is thus free of liability. But at this point in the Court's analysis, the negligence doctrine is introduced into what had previously been a strict-liability formula.

If there be any negligence on the part of the carrier, which, if it had not been present the injury would not have happened, notwithstanding the act of God, the carrier cannot escape liability. The onus is upon the carrier to show not only that the act of God was the cause, but that it was the entire cause; because it is only when the act of God ^{is} the entire cause that the carrier can be shielded.¹⁵

Slater is thus an opinion strongly affirming the liability-producing relevance of negligence even in an act of God situation. (To be sure, the Slater court, in reviewing the facts surrounding the accident, found that those facts were in no way suggestive of the railroad's negligence, and hence denied liability).

In California, a section of the Civil Code (§ 3256) states that "no man is responsible for that which no man can control." According to the California cases, this provision--which expresses the act of God doctrine in California--prevents the imposition of liability only when the act of God is the sole cause of the plaintiff's injury. An 1881 opinion, Chidester v. Consolidated Ditch Co.,¹⁶ remains quite authoritative. In Chidester, a heavy flow of water collected in a ditch which the defendant had negligently failed to repair; the water then

overflowed across the plaintiff's property, causing major damage. According to the California Supreme Court,

No one is responsible for that which is merely the act of God, or inevitable accident. But when human agency is combined with it, and neglect occurs in the employment of such agency, a liability for damage results from such neglect. [The legal rule may be] explained as follows: it would be unreasonable that those things which are inevitable by the act of God, which no industry can avoid, nor policy prevent, should be construed to the prejudice of any [defendant].¹⁷

Obversely, however, if "industry" or "policy" could have avoided or prevented the harm, a defendant can be held liable for its negligence. Indeed, the Court made explicit that a defendant can be found liable for negligently failing to respond to the threat originally created by an act of God:

The Court, at the request of the plaintiff, gave the further instruction: "Negligence is not simply in originating the mischief, for this may be a lawful act, but in not controlling it when put in operation." By this language we understand the Court to have directed the jury that negligence is not simply in originating that which may be the cause of mischief or injury, but that it consists also in failing to control this cause, so as to prevent it from inflicting injury. This, in our judgment, is the fair construction of the instruction, and in this view we can not see that the defendant was prejudiced by its having been given. Whoever originated that which caused the injury, it became the duty of the defendant, from and after the time at which it acquired the ditch, to use the proper means to prevent this cause from¹⁸ producing injury to another. The instruction was correct.

The Chidester opinion also makes clear the discretion enjoyed by the jury in resolving the negligence question.

In a case where reasonable men might, upon deliberation, differ in their conclusions, it would be improper for this court to interfere with the verdict Such a deduction from facts previously determined, must be based upon the experience and observation of the triers, and the experience and observation of this court ought¹⁹ not to be substituted for that of the jury.

It is notable, however, that the act of God in Chidester was easily foreseeable. The fall of water had resulted from melting snow in the nearby mountains. "The overflow so caused is periodical, and may be, and is anticipated by all persons inhabiting the region where the alleged damage occurred."²⁰

Recent California cases have applied the Chidester standards. In two of those cases, Courts of Appeal found that the alleged act of God was indeed so foreseeable as to make it inappropriate for the trial judge even to instruct the jury on the act of God issue. Clarke v. Michals concerned a car that skidded on an icy bridge.

It has been held that in order to constitute an act of God, a storm must be so unusual in its proportions that it could not be anticipated by a defendant. . . . Also, a rainstorm of merely unusual intensity is not an act of God. . . . Likewise, a wind which is not a hurricane nor of such unheard of violence as to be beyond all contemplation or expectation does not amount to an act of God. . . . In the instant case, ice was not in the least unusual in the Larkspur area in the winter, and its formation on the surface of the [bridge] was an occurrence which clearly cannot be deemed beyond all contemplation or expectation.²¹

In Dufour v. Henry J. Kaiser Co.,²² heavy rains washed sand down from the defendant's hillside into the springs of water owned by the plaintiff at the bottom of the hill. As a result, the plaintiff's property suffered substantial damage. According to the Court, the "cumulative effect" of the trial judge's "act of God" and "inevitable accident" instructions "was to blur the jury's view of the real issues--foreseeability of the heavy rain and its harmful results."

Research has uncovered no California case directly concerned with tort liability for personal injuries after an earthquake. Indeed, that research has uncovered only one such case within the entire nation, a case that turns out not to be particularly helpful. In Costacos v. Spence, a 1965 Seattle earthquake had shaken the defendants' pharmacy, rendering it a "shambles, with littered aisles of broken bottles, oils, medicines, and other drug supplies."²³ Two hours later, the plaintiff, shopping in the store, slipped and fell on the slippery oils. The plaintiff alleged that the defendants had been negligent in failing "to maintain the premises in a reasonably safe condition, to give adequate warning of a dangerous condition, [and] in failing to make the premises safe after the earthquake."²⁴ The jury ruled in favor of the defendants, apparently because it believed that the plaintiff had been contributorily negligent in failing to exercise some care in looking where he was going. The Washington Supreme Court, in affirming the jury's verdict, primarily discussed the sufficiency of the evidence in support of the jury's apparent contributory-negligence finding; the issue of the defendant's negligence largely escaped the Court's attention.

A famous nineteenth century English case establishes a framework for assessing the relevance of natural disasters to the negligence standard. In Blyth v. Birmingham Water Works,²⁵ a severe frost froze the water within the water mains which the defendant had installed 25 years previously. This expansion caused a disconnection between the

water main and a fire plug, resulting in a leak which in turn gushed water into the plaintiff's house. The water main had performed perfectly during that 25-year period. The Court of the Exchequer, in finding no negligence, did not even mention the act of God concept; what directly concerned the Court was the issue of foreseeability. At one point in its opinion, the Court indicated that "a reasonable man would act with reference to the average circumstances of temperature in ordinary years." This seems a "weak" expression of the negligence test, especially with respect to water mains that evidently had an expected useful life of many decades. Elsewhere in its opinion, however, the Court refers to the "extreme severity of the frost of 1855, which penetrated to a greater depth than any which ordinarily occurs south of the polar regions." This is a more useful clarification of the foreseeability standard, and has been understood by scholars as containing the essence of the Court's opinion.

At this point, consideration can be specifically given to the foreseeability of earthquakes in its relationship to the doctrine of negligence and act of God. Certainly (to use the language of Clarke v. Michals) an earthquake in California "cannot be deemed beyond all contemplation or expectation." Indeed, hardly a day passes in which the earthquake possibility is not mentioned in the newspapers. That the state of California has adopted formal programs in earthquake preparedness helps make clear the general foreseeability of earthquakes; likewise is the fact that cities have adopted building codes and other ordinances designed to reduce the significance of the earthquake risk. In some general sense, then, earthquakes in California are certainly foreseeable. This is not to say, however, that every earthquake at every location and of any magnitude is necessarily foreseeable. Among other things, the foreseeability issue probably must be considered from the perspective of the "time span" of the activity of the particular defendant (as Blyth suggests). Assume a motorist who is considering a one-time-only trip on a highway in the vicinity of a known earthquake fault; for this motorist's single trip, the prospect of an earthquake may well be infinitesimal. Assume now a landowner who is thinking of erecting (on a location near that fault) a building that is expected to last for a hundred years; here the possibility of an earthquake (even a serious earthquake) seems highly foreseeable. It appears, then, that a number of variables needs to be taken into account, on a case-by-case basis in assessing earthquake "foreseeability." Frequently, however, earthquakes will seem amply foreseeable. Thus, even though there are no cases on record in which the victims of earthquake-induced injuries have secured recoveries, many such recoveries can be predicted in the future.

D. COMPLIANCE WITH REGULATIONS

A number of the specific hypotheticals discussed below raise this common issue: in assessing the tortiousness of the defendant's conduct, what significance should be attached to the fact that the defendant has complied with relevant governmental regulations?

Back in 1892, the United States Supreme Court addressed a similar question in Grand Trunk Ry. v. Ives.²⁶ This was a railroad intersection case in which the railroad was allegedly negligent for

failing to provide a flagman at the particular crossing. The Court was inclined to rule that a jury could reasonably conclude that the absence of a flagman was legally negligent. At this point, however, the Court was required to consider the railroad's argument that the state had adopted a regulatory scheme for designating which crossings required flagmen, and that the state regulators had imposed no such requirement on the particular crossing. The Court proceeded to hold that the absence of such a regulatory requirement did not prevent a jury finding of negligence.

The underlying principle in all cases of this kind which requires a railroad company not only to comply with all statutory requirements in the matter of signals, flagmen, and other warnings of danger at public crossings, but many times to do much more than is required by positive enactment, is, that neither the legislature nor the railroad commissioners can arbitrarily determine in advance what shall constitute ordinary care or reasonable prudence in a railroad company, at a crossing, in every particular case which may afterwards arise. For, as already stated, each case must stand upon its own merits and be decided upon its own facts and circumstances; and these are the features which make the question of negligence primarily one for the jury to²⁷ determine, under proper instructions from the court.

This general idea has been accepted by the Second Restatement of Torts, which provides as follows in § 288c:

Compliance with a legislative enactment or an administrative regulation does not prevent a finding of negligence where a reasonable man²⁸ would take additional precautions.

The Comment to this section specifies that

where a statute, ordinance or regulation is found to define a standard of conduct for the purposes of negligence actions, . . . the standard defined is normally a minimum standard, applicable to the ordinary situations contemplated by the legislation. This legislative or administrative minimum does not prevent a finding that a reasonable man would have taken additional precautions where the²⁹ situation as such were to call for them.

In Peri v. Los Angeles Junction Ry.,³⁰ passengers in an automobile were injured in a collision with a train at a railroad crossing during a heavy fog. A California statute required the railroad to sound a bell or whistle only until the engine had crossed the highway. The negligence alleged by the plaintiffs was the railroad's failure to sound a warning after the engine had passed the crossing.

The California Supreme Court regarded the railway company's compliance with the regulation as not conclusive on the question of its negligence. "The statute is only the minimum of care required" and "circumstances may require it [the defendant] to do more;"³¹ given the special weather conditions in Peri, the Court added, a jury could reasonably believe that a continuing warning from the railroad was required.

A later Supreme Court opinion involving a railroad crossing collision, Hoag v. Southern Pacific Co.,³² echoes the Peri opinion,³³ as do two intermediate court opinions, Lloyd v. Southern Pacific Co.³⁴ and Jensen v. Southern Pacific Co.³⁵ According to Hoag, regulatory requirements set only minimum standards, and "it is usually a matter for the jury to determine whether something more than the minimum was required under the evidence in the case."³⁵ Jensen likewise indicates that safety regulations of this nature establish "minimum, not maximum, requirements."³⁶

Everything said so far suggests that a defendant's compliance with a government standard would not prevent a jury from finding that in the particular case the negligence standard of reasonable care requires even more. Three qualifications to this conclusion must be entered, however. One is that while compliance with regulations may not refute a claim of negligence, this compliance is evidently at least evidence of non-negligence that the jury should consider. See, for example, Berkebile v. Brantly Helicopter Corp.,³⁷ involving a defendant's compliance with FAA safety standards. See also Quinn v. Southwest Wood Products, Inc.,³⁸ in which the Fifth Circuit found that a product's compliance with all relevant OSHA standards may well tip the balance in reaching a conclusion that the manufacturer's product is nondefective as a matter of law.

A second point is that it is easiest to permit a jury to require more than is required by existing regulations when there are "special circumstances" (for example, the heavy fog in Peri) that distinguish the individual case from the general situation that has been addressed by the legislature. In the absence of any such special circumstances it may be harder to argue that the regulatory scheme does not exhaust the defendant's obligations.

Third, characterizing the regulations as establishing merely "minimum" standards may depend on a review and assessment of the particular regulatory scheme. The federal Flammable Fabrics Act, for example, is widely understood to be excessively lenient; it is not surprising, then, to find court opinions specifying that "compliance with federal [anti-flammability] standards, while plainly relevant, is not conclusive on the issue of the [manufacturer's] liability and the jury is entitled to consider any other reasonable evidence on the issue." See Howard v. McCrory Corp.³⁹ As Professor Morris pointed out in 1949, if courts perceive that regulatory arrangements are "unreasonably lax," they are less likely to find that compliance with regulations is clear proof of non-negligence.⁴⁰

In Wilson v. Piper Aircraft Corp., the question was the defectiveness of the defendant's airplane with respect to "various

particulars having to do with both the engine's susceptibility to icing and the crashworthiness of the rear passenger compartment."⁴¹ The Federal Aviation Administration had both approved the general model design and affirmed the airworthiness of the particular aircraft. According to the Oregon Supreme Court, these approvals do not necessarily defeat a claim of defective design, since FAA criteria are "minimum standards only," and since compliance with such standards had been previously held in Oregon not to be "conclusive on the question of tort liability where there is no evidence of a legislative intent that the standards are to be applied for that purpose."⁴² Justice Hans Linde, a former law professor, thought that the FAA issue required greater discussion. According to Justice Linde, common law liability standards for defective design

are at least very similar to the factors that are presumably meant to enter into the FAA judgment whether an aircraft design is safe enough. . . . Once the common-law premise of liability is expressed as a balance of social utility so closely the same as the judgment made in administering safety legislation, it becomes very problematic to assume that one or a sequence of law courts or juries are to repeat that underlying social judgment de novo as each sees fit. When the design of a product is subject not only to prescribed performance standards but to government supervised testing and specific approval or disapproval on safety grounds, no further balance whether the product design is "unreasonably dangerous". . . needs to be struck by a court or a jury unless one of two things can be shown: either that the standards of safety and utility assigned to the regulatory scheme are less inclusive or demanding than the premises of the law of products liability, or that the regulatory agency did not address the allegedly defective element of the design or in some way fell short of its assigned task. . . . It should be the defendant's burden to show that a government agency has undertaken the responsibility of making substantially the same judgment that the court would otherwise be called on to make; and if so, it should then be the plaintiff's burden to show that the responsible agency has not in fact made that judgment with respect to the particular "defect" at issue. . . . This need to examine the precise standards and findings of the governing safety program results not from the legislative preemption of common law standards of liability, absent indications to that effect, but rather from those standards themselves when they are identical with those underlying the regulatory scheme.⁴³

Justice Linde's discussion recognizes an important distinction: while certain regulatory programs do not even profess to establish more than minimum standards, other regulatory programs do ambitiously attempt to fix the type of maximum standards that can also be generated by the law of torts. When a regulatory program does display such ambitiousness, it is descriptively inaccurate to characterize it in "minimum standards" terms. If Justice Linde's resulting legal analysis is sound, and if soundness is one of the goals towards which the California Supreme Court

strives, then the Court might well accept Justice Linde's recommendations should the Court encounter a regulatory program that does indeed incorporate basic negligence-law standards, with all their "inclusive and demanding" character.

E. LIMITATION ON LANDOWNER'S LIABILITY

In cases which a landowner is the defendant, the status of the plaintiff-victim may require attention. Under traditional tort law (as embodied in the Second Restatement), the liability of a landowner depended in a major way on the status of the victim.⁴⁴ Basically, a landowner was liable to the "trespasser" only for willful or wanton misconduct, for so-called "active negligence" directed at a known trespasser, or for an "attractive nuisance" in the event of a child trespasser. If the victim was a "licensee," the landowner could be liable for willful and wanton misconduct, for active negligence, and also for the failure to warn of a hidden danger or "trap." "Licensees" included those who were in fact invited onto the property by the owner, but only for social purposes: for example, a guest at a dinner party. Only an "invitee" was entitled to a full negligence obligation--including the owner's reasonable inspection of property to learn of hazards, and also the owner's reasonable repair and maintenance of property in order to keep it reasonably safe. An "invitee" was traditionally someone on the land for mutual business purposes; the Second Restatement added the category of "public invitees," defined as members of the public who properly enter property that is "open to the public."⁴⁵

In 1968, however, the California Supreme Court decided the landmark case of Rowland v. Christian.⁴⁶ The narrow holding in Rowland is that a jury could reasonably find a landowner liable to a licensee (a social guest) for failure to warn of the property's hidden hazards, whether or not those hazards classify as a "trap." The broader ruling in Rowland, however, is that a general negligence analysis should apply to all landowner cases, notwithstanding variations in the victim's status. The Rowland opinion does indicate, however, that the status of the victim may "have some bearing" on what counts as negligence in the individual case. Justice Burke, dissenting in Rowland, regarded this "some bearing" language as confusingly vague.

As it happens, the specific hypotheticals do not really raise many vivid Rowland questions. In those hypotheticals, almost all of the victims seem to be either employees or invitees (in the sense of either business visitors or public invitees). No problems are presented concerning either trespassers or the homeowner's social guests. Since other earthquake tort situations might, however, involve licensees or

*Of course, when the victim is the employee of the building owner, that victim is covered not by the law of torts but rather by the law of workers' compensation.

trespassers, it is worthwhile to consider the implications of Rowland. The BAJI jury instruction that was drafted as a response of Rowland (for the benefit of California trial judges) merely stipulates that

the owner of premises is under a duty to exercise ordinary care in the management of such premises in order to avoid exposing persons to an unreasonable risk of harm. A failure to fulfill this duty is negligence. Ordinary care is that care which persons of ordinary prudence would use in order to avoid injury to themselves or others under circumstances similar to those shown by the evidence . . . [I]n determining if the defendant exercised such care, you should consider all the surrounding circumstances shown by the evidence.⁴⁷

In applying Rowland in one case involving an invitee, one Court of Appeal has looked to typical negligence variables: "the likelihood of injury, the probable seriousness of such injury, the burden of reducing or avoiding the risk."⁴⁸ In at least two cases involving persons who, previous to Rowland, would have been classified as mere licensees, Courts of Appeal have ruled that the landowner has an apparent obligation not only to warn but also to make the property reasonably safe.⁴⁹ Both of these cases involved homeowner-defendants who were typically protected from a full negligence obligation by the traditional categories.

In Mark v. Pacific Gas & Electric Co.,⁵⁰ a plaintiff was electrocuted as he reached from his apartment window in order to disengage a defective street light. The California Supreme Court found the electric company liable for its negligence, even though, pre-Rowland, the plaintiff could have been classified as a technical "trespasser" upon the power company's street light property. The other significant trespasser case is Beard v. Atchison, T. & S.F. Ry.⁵¹ In Beard, a fourteen-year-old boy lost his legs as he attempted to hop, in a trespassory way, onto a moving freight train run by the defendant. Beard affirms one point suggested by Rowland: that the status of the plaintiff may bear on the foreseeability of harm. In Beard, only if the railroad had reason to anticipate trespassers would the railroad be obliged by negligence law to adopt any precautions at all. (In Beard, the Court of Appeal concluded that the plaintiff was entitled to a jury trial on the foreseeability issue.) As for negligence, the Beard plaintiff's first allegation was that the railroad "failed to take action to prevent such [trespassory] activity, either by maintaining a better lookout on the train or by a stricter police of its right-of-way."⁵² In essence, the plaintiff argued that the railroad was negligent in merely allowing the plaintiff to do what he wished to do--that the railroad was negligent in having failed to prevent the plaintiff from committing an offence against the railroad. That the Court of Appeal approved the appropriateness of this negligence allegation verifies the power of the Rowland ruling. (Note, however, that negligence allegations of this sort had not been uncommon in the pre-Rowland "attractive nuisance" cases.) In Beard, the plaintiff's second allegation was that the railroad was negligent in maintaining a loose sill step on a boxcar, in violation of statute. Now this is an

element of railroad negligence that could well have imperiled persons using the train for entirely appropriate purposes; as such, it tells us little about Rowland's reach. And while the Beard Court denied that the plaintiff's status as trespasser categorically disabled him from suing, the Court also made clear that the plaintiff's trespassory act--jumping upon a moving train--might well constitute either contributory negligence or assumption of risk. Hence the implications that can be drawn from the plaintiff's conduct might well defeat or diminish his claim after all.⁵³ But if so, this would be because of the jury's conclusion that the act was deliberately risky (and hence an assumption of risk) or unreasonably risky (and hence contributorily negligent), and not just because of the judge's view that the act was a violation of the defendant's property rights.

An excellent review of Rowland was prepared in 1981 by Professor Hawkins.⁵⁴ Studying the response to Rowland in other state courts, Hawkins found that eight states have followed Rowland wholly, while five states, though adhering to Rowland in rejecting the licensee-invitee distinction, have nevertheless chosen to retain the trespasser category. And states in fifteen jurisdictions have declined to follow Rowland altogether; these courts have either endorsed the traditional rules, deferred to the legislature,⁵⁵ or reserved the entire question for subsequent consideration. Reviewing the limited number of post-Rowland opinions in California, Professor Hawkins' conclusion is that "premises liability cases have [not] been irresponsibly abandoned to jury discretion."⁵⁶ Hawkins regards opinions like Carlson, Fitch, Mark, and Beard as basically "moderate" in character.

F. AFFIRMATIVE DUTIES

In its ordinary application, tort law determines the liabilities of a person who in one way or another actually causes another person to suffer injury. What happens, however, if the defendant merely fails to intervene in order to prevent an accident from happening?: is the defendant obliged to act as a Good Samaritan? The position adopted by the common law is that, as a general rule, there is no "affirmative duty" to prevent harm or to provide a rescue.

There are a number of exceptions, however, to this general rule against "affirmative duties." Under the so-called "undertaking" doctrine, if A undertakes to provide assistance to B, and if A's termination of that undertaking makes B "worse off" than B would have been had the undertaking never been initiated, then A is not simply free to walk away from the undertaking; at this point A is subject to an affirmative duty.⁵⁷ Moreover, if the court concludes that there is a "special relationship" between A and B, the court will also recognize that A is subject to an affirmative duty.⁵⁸ Father-son and doctor-patient are often given as prime examples of such "special relationships."

Also, under § 321 of the Second Restatement of Torts,

If the actor does an act, and subsequently realizes or should realize that it has created an unreasonable risk of causing

physical harm to another, he is under a duty to exercise⁵⁹ reasonable care to prevent the risk from taking effect.

The next subsection of § 321 makes clear that the affirmative duty attaches even if there was no negligence in the actor's operations which originally brought about the risk.⁶⁰ This Restatement rule⁶¹ has been effectively accepted in California. In Tresemmer v. Barke,⁶¹ a physician placed a "Dalkon Shield" contraceptive device within his woman patient; he later learned of certain medical hazards associated with the Dalkon Shield; at that time he failed to make any effort to notify the patient of the dangers in question. A California Court of Appeal made clear that even though the physician's original conduct was legally innocent, that physician, having acquired new knowledge, was now under some duty of care to communicate that knowledge to the patient. One has no doubt that the California Supreme Court would affirm Tresemmer and endorse the Restatement's affirmative-duty rule in any appropriate case. Indeed, in California the entire doctrine of "no affirmative duty" has recently been placed under a cloud.⁶² The Supreme Court, in Tarasoff v. Regents of University of California,⁶² has itself denounced the doctrine as "morally questionable" and hence subject to an expanding list of exceptions and qualifications, if not actual abrogation.⁶³ A recent Court of Appeal opinion, Saldano v. O'Daniels,⁶³ suggests that the doctrine may have outlived its usefulness and should be thoroughly reconsidered.

G. TORT DISCLAIMERS

Assume the defendant has, prior to the earthquake, entered into a contract with the plaintiff that professes to disclaim its tort liability. Is such a disclaimer valid? The leading California opinion on the propriety of negligence liability disclaimers is Tunkl v. Regents of University of California.⁶⁴ In this case the UCLA Hospital insisted on a disclaimer from a charity patient receiving medical treatment at the Hospital. The California Supreme Court ruled, as a general matter, that negligence disclaimers are invalid if they "affect the public interest." According to the Court, six factors bear on the "public interest" question: (1) whether the business is generally suitable for public regulation; (2) whether the service provided by the defendant is of "great importance" to the public, a "practical necessity" for some members of the public; (3) whether the defendant is holding himself out as willing to provide this service to the public generally; (4) whether there is a lack of equal bargaining power between the defendant and the plaintiff; (5) whether the disclaimer is included in a standard "form contract" that lacks any arrangements whereby a plaintiff--by making some additional payment--can secure protection against negligence; and (6) whether the relationship between the defendant and the plaintiff places the plaintiff basically under the defendant's control. In Tunkl, the Court found that all six of these "public interest" factors were satisfied, and hence held the disclaimer clearly invalid. The Court's opinion left open, however, the question of what combinations and permutations of the six factors would be sufficient to support a "public interest" finding.

There have been surprisingly few personal injury cases subsequent to Tunkl that have required judicial consideration of negligence disclaimers in light of the Tunkl standards. In Vandermark v. Ford Motor Co.,⁶⁵ a Court of Appeal relied on Tunkl in invalidating a manufacturer's disclaimer. While the California Supreme Court later affirmed the Court of Appeal's result, it did so without resorting to a Tunkl analysis. (Rather, the Supreme Court emphasized the specialness of products liability, and characterized the disclaimer as applying only to the manufacturer's warranty liability; even at face value, therefore, the disclaimer was inapplicable to the plaintiff's strict tort liability claim.) In Belshaw v. Feinstein,⁶⁶ a Court of Appeal relied on Tunkl in invalidating the disclaimer which stereotomic surgeons had secured from their (non-charity) patient. The Belshaw court found that all six Tunkl factors were present--partly because the defendants were the only doctors in the locality capable of performing the surgery in question.

Five years later, in Henriouille v. Marin Ventures, Inc.,⁶⁷ the California Supreme Court considered the application of Tunkl to a disclaimer of negligence liability in a private residential lease. A unanimous court, in an opinion authored by Chief Justice Bird, invalidated the disclaimer, finding that all six of the Tunkl criteria were satisfied. Housing and residential leases are subject to regulation; the landlord effectively offers his apartments to the public generally; "in a state and local market characterized by a severe shortage of low-cost housing, tenants are likely to be in a poor position to bargain with landlords;"⁶⁸ there was no indication that the tenant had any option of purchasing additional protection; and tenants are exposed to the landlord's control and hence to the risk of the landlord's negligence.

H. A "CAUSE OF ACTION" FOR EMOTIONAL DISTRESS

If, in an earthquake, a person does not incur a physical injury, but nevertheless suffers significant emotional distress, can he secure a recovery from a negligent defendant?

The law has witnessed several stages in the development of a "cause of action" for the negligent infliction of emotional distress. In "stage 1," a plaintiff is allowed to recover for the "physical" or "hard" pain and suffering that is incidental to having suffered an actual physical injury. California law (like the law elsewhere) has long agreed that pain and suffering of this sort is compensable in a tort action.⁶⁹ In "stage 2," a clear physical injury produces "soft" or merely "emotional" pain: for example, the embarrassment⁷⁰ that may be incidental to a facial scar. Courts in almost all states, including California,⁷¹ now allow recovery for emotional suffering of this sort.

What if, however, the negative emotion experienced by the plaintiff consists merely of fear or apprehension--apprehension relating to some serious injury that the plaintiff was (fortunately) just able to avoid? In "stage-3" cases, this apprehension is combined with some "impact" between the defendant's negligent instrumentality and the plaintiff's body. If there is "impact," however trivial, American courts generally

allow recovery for the plaintiff's apprehension.⁷² In "stage 4," there is no impact; nevertheless, the plaintiff suffers reasonable apprehension because he is in the "zone of danger" created by the defendant's negligent activity. Courts have divided as to whether it is proper to allow recovery in such "zone of danger" situations.⁷³ In "stage 5," the plaintiff is not herself in the zone of danger at all, but is instead merely a spectator of a physical injury that is suffered by a close relative; the plaintiff understandably suffers anguish by virtue of witnessing that injury. A limited number of courts have now allowed recovery in "stage-5" non-zone-of-danger "spectator" cases.

As it happens, California has been a pioneer in the recognition of a stage-5 legal claim. In its 1968 opinion in Dillon v. Legg,⁷⁴ the California Supreme Court affirmed the spectator's right to sue. The Dillon precedent was promptly⁷⁵ rejected, however, by New York's highest court in Tobin v. Grossman; courts in other jurisdictions have been debating the Dillon vs. Tobin issue ever since. But if California allows even the "stage-5" spectator to recover, then one would certainly expect that a recovery can be secured in California by stage-4 plaintiffs who suffer direct personal apprehension on account of being within the "zone of danger." And the California cases confirm this expectation. Amaya v. Home Ice, Fuel & Supply Co. is a pre-Dillon opinion that (as it happens) had doubted the spectator's cause of action; still, in Amaya, the California Supreme Court made clear that the

impact rule is [not] in force in California. . . . We hold . . . that plaintiff's failure to allege a contemporaneous physical impact upon her person is not, of itself, fatal to her attempt to state a cause of action . . . for personal injuries resulting from⁷⁶ the internal operation of negligently induced fright or shock.

Two subsequent Court of Appeal opinions, Vanoni v. Western Airlines⁷⁷ and Leasman v. Beech Aircraft Corp.,⁷⁸ concern plaintiffs who were passengers on airplanes which encountered emergencies that created the prospect of a crash. These plaintiffs were obviously within the zone of danger created (in Vanoni) by the airliner's negligence and (in Leasman) by the negligence of the airplane manufacturer. Both Courts made clear that the plaintiff can recover for apprehension, notwithstanding the absence of impact.

Assuming, however, that a plaintiff merely seeks recovery for emotional distress, there is an additional complication. Dillon v. Legg had indicated that the spectator-plaintiff, in order to recover, must demonstrate some "physical injury" produced by or associated with the emotional distress. The two airplane "zone of danger" cases, Vanoni and Leasman, had likewise required the identification of some "physical injury;" the Leasman court indeed ruled against the plaintiff precisely because the record conclusively indicated the absence of any physical injury. Ten years after its⁷⁹ Dillon opinion, the California Supreme Court, in Krouse v. Graham, reaffirmed that physical injury is a requirement in the spectator's suit against the negligent defendant. Krouse also made clear, however, that the "physical injury" need not be

very serious. The Krouse plaintiff had allegedly experienced a "serious shock to his nervous system," which had brought about "gastric disturbance for which he was subsequently treated." According to the Court, this "gastric disturbance" was sufficient to satisfy the "physical injury" requirement.

That requirement has subsequently been greatly confused, however, by the Supreme Court's opinion in Molien v. Kaiser Foundation Hospitals.⁸⁰ Molien is, in a sense, "stage 6"-- a "pure" case of negligent infliction of emotional distress. The defendant's doctor negligently diagnosed the plaintiff's wife as suffering from syphilis; before this misdiagnosis could be corrected, the patient and the husband-plaintiff proceeded to quarrel in a way that led to their marital separation, a separation that was emotionally painful to the husband. (Moreover, the eventual correction of the diagnosis was apparently unsuccessful in bringing about a reconciliation). Even though the husband declined to allege that he had suffered any physical injury, the California Court affirmed his right to sue for his emotional distress. The Court regarded the "physical injury" requirement as an "artificial barrier to recovery" that is not at all necessary in order "to corroborate the authenticity" of an emotional distress claim. Moreover, the physical injury requirement "encourages extravagant pleading and distorted testimony"; additionally, "the border between physical and emotional injury is not clearly delineated." If physical injury is thus no longer required in California in a "stage-6" Molien situation, it can fairly be assumed that it is also no longer required in a stage-4 zone-of-danger situation. Indeed, Vanoni's physical injury holding is expressly cited in Molien as an illustration of the previous rule which the Molien Court appreciated that it was overturning.

I. WORKERS' COMPENSATION: COVERAGE OF EARTHQUAKE INJURIES

If it is an employee who is injured during an earthquake, the employee's rights against his employer would be primarily determined by the law of workers' compensation. What, then, is the general application of workers' compensation in earthquake situations?

Workers' compensation entails liability of a genuinely strict sort. There is no requirement of "defect" or "abnormally dangerous;" all the employee needs to show is that his injury occurred⁸¹ "in the course of" his employment and "arose out of" his employment. (While the California statute also speaks of injuries that are "proximately caused" by the employment, courts have interpreted "proximate cause" as a mere restatement of the "arising out of" requirement.)⁸² Clearly, the injuries described in Hypothetical A occur "in the course of" employment. Can it be said, however, that they "arise out of" the employment? By the same token, is there any doctrine of act of God in workers' compensation that clarifies or limits the "arising out of" standard?

Two leading opinions come from the California Supreme Court. In London Guarantee & Accident Co. v. Industrial Accident Comm.,⁸³ an employee was killed during a 1925 Santa Barbara earthquake when the walls fell in the building where he was working. The evidence

adequately showed that the building itself was of defective construction, and that this defectiveness contributed to the building's collapse. Relying on the point that the building had been "constructed of either inferior materials or by improper workmanship," the Court concluded that the employee had been exposed to a risk "greater than the risk which the public in that vicinity was subject" ⁸⁴ Hence, according to the Court, the injury arose out of the employment, and workers' compensation guaranteed the employee's recovery. In the companion case of Enterprise Dairy Co. v. Industrial Accident Comm., ⁸⁵ a building collapsed on an employee who had been loading a vehicle with milk bottles; broken glass resulted in the "severe contusions" which the employee suffered. Since it was the employment that initially subjected the employee to the risk of glass, the Court affirmed that the employee had been subjected to a risk that was "different from and in addition to those [risks] to which other persons were exposed." ⁸⁶ The Court hence approved a workers' compensation recovery.

In California, later workers' compensation cases involving earthquakes have been decided only at the Commission level. In three cases recoveries have been endorsed. In Patterson v. Zel Smith & Gussie Spears, an employee was injured by the collapse of a building during the Tehachapi earthquake; ⁸⁷ the Commission affirmed a workers' compensation award on the theory that the "adobe" walls of the building were earthquake-vulnerable in a way that subjected the employee to a "peculiar risk" of injury by earthquake. In Garcia v. Hise, ⁸⁸ a bus-boy-employee was sleeping at night in premises provided by the employer when an earthquake hit. He fell from the top of a double-deck bunk which was itself unfastened either to walls or floor, and which was not even furnished with any ladder. Obviously referring to the condition of this bunk, the Commission found that the victim's employment had "especially exposed" him to an earthquake risk, and that he therefore could recover in workers' compensation.

In two other cases, however, the Commission denied recoveries. In Slaughter v. Industrial Accident Comm., ⁸⁹ an employee was injured in the 1933 earthquake when the wall adjacent to the store in which he was working collapsed on the roof of that store which then caved in. The Commission rejected the employee's suggestion that the construction of the store was in any way deficient. In the absence of such a deficiency, the Commission held that the injury "was due entirely to an act of God, unassisted by human agency or fault, and therefore did not arise out of the employment." Likewise, in Stones v. Hardware Mutual Casualty Co., ⁹⁰ an employee was injured by the collapse of a store during the 1933 earthquake. Relying on engineers' testimony that the building was constructed "strictly in accordance with the best official and unofficial requirements as to workmanship and material existing prior to said earthquake," the Commission ruled that the injury was due to "an act of God, and was not compensable."

There is irony in the rulings in cases like London Guarantee and Garcia. In London Guarantee, it was negligence in construction that supported the Court's finding of a "special risk;" in Garcia, the unfastened bed that created the "especial exposure" was likewise suggestive of negligence. But if the employer is guilty of negligence, the

employee may well be better off denying that the accident "arose out of the employment" (and that workers' compensation hence applies). For if workers' compensation does not apply, the law of torts does apply. If (as assumed) the employer has been negligent, then a tort claim against the employer is quite viable; and tort damages are typically a multiple of workers' compensation damages.

Two developments in California workers' compensation law during the last thirty years suggest, however, that workers' compensation coverage for earthquake injuries may have expanded since Slaughter and Stones. One development is the so-called "contact with the premises" rule.⁹¹ In Employers Mutual Liability Ins. Co. v. Industrial Accident Comm.,⁹¹ an employee, while walking down an aisle, suffered an "idiopathic" seizure--a seizure in no way connected with his employment--which caused him to fall to the concrete floor and strike his head thereon. The California Supreme Court affirmed a workers' compensation award, reasoning simply that the injury was caused by "the impact of the employee's body with an object or surface of the employer's premises."⁹² The Court reached this conclusion even though recognizing both that the fall itself was not due to the employment and that the risk of such an injury is not at all "peculiar to the employment in the sense that it would not have occurred elsewhere."⁹³ (The Court relied in part on the workers' compensation maxim that reasonable doubts are to be resolved in favor of compensability.)

Consider, in addition, the so-called "positional risk" doctrine. Assume that an employee is struck by a stray bullet (or a bolt of lightning); assume further that the employee was at the particular location where the bullet arrived (or the lightning struck) because of the demands of his job; assume additionally that there was nothing about that location that rendered it in any logical way vulnerable to the risk of stray bullets (or lightning). In these circumstances, even though the causal relationship between employment and injury can be characterized as "fortuitous," it can still be said with accuracy that "but for" the job assignment that took him to a particular location, the employee would not have suffered injury. In its early opinion in London Guaranty, the California Supreme Court had denied that circumstances of this sort are enough to justify compensation. "It is not sufficient for a workman to say, 'I should not have been injured unless I had been where I was and doing the work which I was employed to do.'"⁹⁴ However, subsequent opinions in many jurisdictions have been sympathetic to what is now referred to as the "positional risk" doctrine;⁹⁵ that doctrine has been endorsed, moreover, in the Larson treatise⁹⁵ the leading treatise-authority on workers' compensation law. Moreover, the positional risk doctrine has been upheld by a leading opinion from a California Court of Appeal, Industrial Indemnity Co. v. Industrial Accident Comm.⁹⁶ (This was a stray bullet case; the Court was willing to assume that nothing in the victim's employment enhanced the risk of being struck by a stray bullet.)

The positional risk doctrine, like the contact with premises doctrine, seems capable of overriding the compensation-denying result reached in Slaughter and Stones. In one way, however, an earthquake might differ from lightning for purposes of the positional risk idea. Lightning arrives at one location and one location only; an earthquake, by contrast, might devastate an entire locality. If the latter is the case, then the victim would have been equally exposed to injury had he happened to be at home in bed rather than at work. If this is so, the employee's claim for compensation would be at its weakest, since even with "hindsight" there was nothing about the employee's job-related "position" that exposed him to the earthquake risk, and since his own residence might equally have collapsed on his head. Even here, however, the contact-with-premises doctrine, as described by Employers Mutual, might permit a workers' compensation recovery.

J. WORKERS' COMPENSATION FOR EMOTIONAL DISTRESS

Assume an employee, otherwise eligible for workers' compensation, whose only injury consists of emotional distress. To what extent can that employee recover in workers' compensation?

A basic point is that under workers' compensation, there can be no recovery, as such, for pain and suffering or for unpleasant psychological experiences. (The opportunity of a tort plaintiff to recover for "apprehension" is thus denied to the workers' compensation claimant.) What if, however, the emotional distress--operating, perhaps, on the employee's prior emotional vulnerability--disables the employee in a way that requires medical treatment, or which causes the employee to suffer wage losses?

The Larson treatise organizes these "emotional injury" cases into several categories. In the first category, an emotional stimulus brings about a clear physical injury; states are here unanimous in affirming that compensation is appropriate. One California case falls⁹⁷ solidly within this category. In Lamb v. Workmen's Comp. App. Bd., the workers' compensation referee found that the emotional stress of his job precipitated the employee's fatal heart attack; accepting this finding, the California Supreme Court awarded compensation. In the second category, a "real" physical injury occurs and the employee suffers disabling emotional distress as he reflects back upon that injury. In these cases, also, there is a consensus in favor of compensation. One California opinion, Zurich Insurance Co. v. Workmen's Comp. App. Bd.⁹⁸ contributes to that consensus (although the Zurich court emphasized that it was not the neurosis itself that disabled the employee, but rather the experience of apparent physical pain which that neurosis produced). In the third category, the emotional distress is the product of a merely emotional stimulus. Within this category, jurisdictions are divided as to whether compensation is appropriate; jurisdictions are more likely to award compensation, however, if the emotional stimulus itself is provided by a sudden, identifiable, "traumatic" event, rather than by job conditions that continue over a long period⁹⁹ of time. For example, in Bailey v. American General Insurance Co., the Texas Supreme Court awarded compensation to an employee who, though lucky enough to avoid

physical injury when his scaffold fell, later was "paralyzed on the job" as he considered this near-miss.

California law seems remarkably generous in its attitude towards emotional disabilities. California cases allow recovery even when the emotional disability is the result of an emotional stimulus, even when that stimulus is itself "gradual" rather than "traumatic" in character, and even when the employee's own emotional vulnerability seems the primary explanation for the emotional disability. In Baker v. Workmen's Comp. App. Bd., a fireman suffered "psychoneurotic injury" as a result of the "cumulative effect of each day's stresses and strains."¹⁰⁰ A Court of Appeal insisted on compensation. In Albertson's Inc. v. Workers' Comp. App. Bd.,¹⁰¹ there was a series of conflicts between the employee and the employer, conflicts which led the employee to believe that he was being subjected to "job harassment;" this perception in turn brought about her "psychiatric injuries." What made the case especially difficult was the Court of Appeal's finding that the employee was not being harassed in fact; rather, her perception of harassment grew out of her longstanding psychological vulnerabilities. Nevertheless, emphasizing that "industry takes the employee as it finds him" and believing that the job conflicts were a contributing cause to the psychiatric disorder, the Court affirmed compensation in a 1982 opinion. A mere month later, another Court of Appeal approved a recovery in Ditler v. Workers' Comp. App. Bd.¹⁰² In this case, a public school teacher was shifted from one school to another; the shift produced nervous tension, anxiety and depression which led the employee first to secure medical leave and then to apply for workers' compensation. Finding that the shift in jobs was the "trigger" of the employee's psychiatric disability, the Court of Appeal concluded not only that compensation was appropriate, but that the cost of the injury should, for compensation purposes, be assigned solely to the employer and should not be "apportioned" between the employer and the prior emotional deficiencies that rendered the employee especially vulnerable to a disabling overreaction.

The generosity of California law makes clear that employees can generally recover for any disabling neuroses produced by an earthquake. For many employees, the emotional disability might be related to at least a minor physical injury produced by the earthquake; in these cases, granting a workers' compensation recovery would be especially easy. Other employees might be affected by the sudden experience of the traumatic earthquake. If California cases like Baker and Albertson affirm recoveries even in the absence of trauma, it is all the more obvious that an employee can recover in California for emotional disabilities that do result from a single traumatic incident. And under all the California opinions, that the emotional disability is largely due to the employee's prior emotional vulnerability is a fact that is largely without relevance.

III. SPECIFIC HYPOTHETICALS

HYPOTHETICAL A -- RELATED TO AN OLDER HIGH-RISE OFFICE BUILDING

The company knows, either from its design professional or by a public inspection, that its high-rise office building is hazardous and could suffer damage in a moderate earthquake--either because of the facility's design inadequacy or geologic setting. The company takes no action and a moderate earthquake then occurs, resulting in many injuries and deaths among its employees, lessees and members of the public. Building occupants trapped in the upper stories for extended periods suffer extreme psychological distress.

1. Negligence (and Causation)

There is no obvious doctrine of strict liability that would apply to the tort liability of the company whose building has been hard-hit. The company is liable, therefore, only if it has been negligent. The negligence standard is described above in Part II-A (pp. 1-2). In Hypothetical A, it is specified that the company, prior to the earthquake, had actual knowledge of the earthquake hazard which its building occasions. In assessing the size of the foreseeable risk, one needs to know what the probability is of what earthquakes of what magnitudes; in a tort suit, these estimates would be rendered by a lay jury. Given this, whether "taking no action" is legally negligent depends on the jury's assessment of whatever courses of conduct are available to the company that would have reduced or minimized the risk at reasonable cost. And if this is the issue, then one obviously relevant sub-issue concerns the point in time at which the danger did become known or knowable by the company. If the company knew (or should have known) of those risks at the time it was designing the building, then the negligence question concerns alternative designs that were available at that time, before construction had commenced. If, however, the company was reasonably unaware of the danger until after the building was completed, the negligence question would concern whatever retrofitting or reconstruction strategies were then available to the company.

Bland general conclusion: the company may be negligent in tolerating this danger. Once the form of negligence has been identified, however, there will still be a question as to whether this negligence was a "but-for" cause of the various injuries. See the general discussion in II-B above (pp. 2-3). Conceivably, the company is also negligent in not having given a warning of the danger to persons entering its building. The obligation to warn would probably attach, however, only if the risk was quite substantial, and only if the risk was peculiar to the particular building (rather than common to the neighborhood). And even if the failure to warn is negligent, the plaintiff must still prove causation--that giving a warning would have made a difference. The difficulties surrounding the issues of both negligence and causation make the "warning" theory rather dubious in Hypothetical A.

2. Act of God

Assume now that the plaintiff may be able to demonstrate some negligence on the part of the defendant. An earthquake is the kind of event that the law often refers to as an "act of God." Nevertheless, as II-C above indicates (pp. 3-7), within the law of torts, act of God tends to collapse into the general issue of foreseeability. How foreseeable an earthquake is in Hypothetical A depends, in part, on facts not disclosed: for example, the building's proximity to known faults. But a finding of foreseeability would hardly be surprising.

3. Lease Disclaimers

The hypothetical specifies a lease running from the owner of the property. Such leases quite commonly include the landlord's "waiver" or "disclaimer" of tort liability. Would California courts recognize the legality of such a disclaimer?

Disclaimers are discussed above in II-F (pp. 13-14). Henriouille--the residential lease case--is obviously the closest authority on the issue of the validity of the lease disclaimer assumed in Hypothetical A. Nevertheless, there are obvious differences between a residential lease and a commercial lease of the sort involved in Hypothetical A. It is not true that a commercial lease provides a "basic necessity" like "shelter"; and there is no obvious shortage of commercial properties which places the commercial lessor at a keen bargaining disadvantage vis-a-vis the property owner. Commercial property is, however, subject to regulation; the property in Hypothetical A is presumably offered for rent to the general public; it can be assumed that the property owner did not offer to withdraw the disclaimer if the tenant made an additional payment; and those occupying the facility were, as in Henriouille, exposed to the landlord's control of the building. Under Tunkl, the question thus is: is a disclaimer invalid if factors 1, 3, 5, and 6 from Tunkl are present, even though factors 2 and 4 are not? The answer to this question is anyone's guess; but a reasonable guess is that the Supreme Court would regard the combination of four factors as strong enough to invalidate the disclaimer.

There is an additional line of analysis, however, that might relieve the plaintiffs of the burden of establishing that the disclaimer is invalid. The (assumed) disclaimer appears in a contract between the property owner and the tenant. Now a tenant may, by contract, waive his own legal rights (subject, of course, to Tunkl). It is not apparent, however, that the tenant has the legal capacity to waive whatever tort rights may be enjoyed by people other than the tenant, people who may be within the rented property at the time that injuries are inflicted. That is to say, the commercial tenant can perhaps abandon his own tort rights, but cannot give away the tort rights of his customers or his

* This analysis of act of God can be repeated, with appropriate changes in wording, in each of the hypotheticals below.

employees. This line of analysis can be fortified both by a recent New York opinion and by a pair of early California opinions. In Velez v. Craine & Clark Lumber Corp.,¹⁰³ the New York Court of Appeals acknowledged that a manufacturer may be able to disclaim its (strict) tort liability in its contract with those purchasing its product. The plaintiff in Velez, however, was an employee of the company that had purchased the product from the manufacturer. According to the Court, the employee was a "stranger" to the sales agreement that had included the disclaimer; hence that disclaimer could not affect the employee's rights vis-a-vis the manufacturer. In Stevens v. Southern Pacific Co.,¹⁰⁴ a 1895 California opinion, the defendant was a railroad that leased property adjacent to the railroad to a plaintiff, who used that property for warehouse purposes. The lease between the railroad and the property owner stated that the railroad would be free of liability for any railroad-originated fires which might destroy the rented property. After a fire caused by the railroad's negligence had burned down the warehouse, the plaintiff sued the railroad. The Court honored the liability disclaimer, rejecting (in a somewhat pre-Tunkl fashion) the plaintiff's argument that the disclaimer was contrary to public policy. A companion case was Kane v. Southern Pacific Co.¹⁰⁵ Here the plaintiff was a customer of the warehouse, a customer whose property had been in the warehouse at the time of the fire and which hence had been destroyed. The California Court allowed this customer to collect from Southern Pacific--on the theory that the customer was not himself a party to the contractual restriction on the railroad's liability, and that the warehouse is powerless to waive its customer's tort rights. (The Court went on to specify that even the customer's knowledge of that disclaimer would not result in the reduction of his own tort rights.) It appears, then, that if the person victimized in an earthquake while on rented property is anyone other than the tenant himself (or perhaps a member of his immediate family), then any disclaimer that the tenant may have agreed to could not be enforced in a suit by that victim.

4. A Tort Recovery for Emotional Distress

Tort recoveries for emotional distress are discussed in II-H (pp. 15-17). The plaintiffs in Hypothetical A who suffered apprehension are plainly in the "zone of danger" created by the combination of the earthquake and the defendant's (assumed) negligence. Therefore, their right to recover seems secured by Amaya, Vanoni, and Leasman. Additionally, the fact that these plaintiffs have been physically shaken by the trembling building could be regarded as establishing a minimum "impact," even if California law required impact--which it doesn't. If the defendant has indeed been negligent, the plaintiffs would not be precluded from recovering for their emotional harm.

5. Workers' Compensation Coverage

What if the earthquake victim is an employee at the time of his injury? If the victim is an employee of anyone other than the building owner, then his rights against his own employer may well be governed by workers' compensation; still, his rights against the building owner are determined in accordance with ordinary tort principles. Tort is, moreover, "primary" in its relationship with workers' compensation; the

employer is entitled to a refund from the employee for the employer's previous workers' compensation payment if the employee later recovers a larger amount in tort from a negligent third party.

Assume now, however, that the victim is an employee of the building owner itself. In these circumstances, whatever rights the victim possesses are covered by workers' compensation. Workers' compensation for earthquake injuries are discussed above in II-I (pp. 17-20). In all, the injured employees in Hypothetical A probably can recover for their physical injuries. In Hypothetical A, the earthquake--like the fall in Employers Mutual--is not caused by the employment; nevertheless, the injury is immediately caused by the contact between the collapsing building and the employee. Under Employers Mutual, this might well be enough for compensation. What makes this case even easier is that the employer's facilities, due to their (assumed) "design inadequacy or geologic setting," do indeed create the kind of "greater risk" referred to in London Guarantee and Enterprise Dairy. Hence the employees need not even venture their "contract with premises" and "positional risk" arguments, except as fallbacks.

6. The "Exclusivity" of Workers' Compensation

If we assume some negligence on the part of the building owner, then the employee of that owner might prefer to sue the owner in tort (rather than merely claiming in compensation) because of the generous measure of damages available in tort. Such a tort suit would appear to flounder, however, upon the doctrine that workers' compensation is the employee's "exclusive remedy" against the employer. Is there any way in which the employee could escape the application of the "exclusive remedy" doctrine?

As of the end of 1981, the answer to this question was possibly affirmative. Under the facts of Hypothetical A, the earthquake inflicted injuries on employees and non-employees in a rather non-discriminating way. Given the injuries by the non-employees, it can be argued that it was a mere fortuity that any particular victim happened to be in the employ of the building owner. In Duprey v. Shane,¹⁰⁶ the California Supreme Court developed a "dual capacity" doctrine that enabled certain employee-victims to escape the limitations of workers' compensation. In Duprey an employee was injured on the job and then received medical treatment provided by the employer and another employee. This treatment was badly performed, setting the stage for a malpractice argument relating to the aggravation of the employee's original injury. And the California Supreme Court allowed the employee to sue the employer for the malpractice tort, reasoning that in this case the employer enjoyed the "dual capacity" of both employer and doctor, and that workers' compensation did not prevent a tort action against the employer in its non-employer "capacity." The Duprey doctrine was dramatically affirmed in late 1981 by the California Supreme Court in Bell v. Industrial Vangas, Inc.¹⁰⁷ Here an employee was injured while driving on the job; the injury was immediately occasioned by a defect in a product that had been manufactured by the employer and provided to the employee for purposes of his job

assignment. The California Court ruled that this employer had the "capacity" of manufacturer as well as employer, and that in his manufacturer "capacity" it could be sued in tort by the employee-victim under a products liability theory. Justice Richardson, dissenting, asked this question

[i]f an employer is to be held civilly liable to injured workers in the employer's capacity as a "manufacturer," what compelling reason could exist for denying similar liability for injuries attributable to the employer's other relationships including his status as "landowner," "motor vehicle operator," or "cafeteria proprietor?" Yet employers in our "pluralistic society" frequently assume multiple roles in the course of their ordinary business pursuits.¹⁰⁸

Justice Richardson's indication of how the dual capacity doctrine could be extended suggests ways in which the employer in Hypothetical A might be vulnerable to a tort suit brought by the injured employee; the employee could simply argue that the accident had resulted from the employer's "dual capacity" as "landowner" rather than as employer.

Both Bell and its possible extensions have subsequently been wiped out, however, by the California legislature. In September 1982, legislation was passed that significantly increased the level of payments available to injured employees under workers' compensation. That same statute abrogated, however, the dual capacity doctrine:

Where the conditions of [workers'] compensation . . . concur, the right to recover such compensation is . . . the sole and exclusive remedy . . . against the employer, and the fact that either the employee or the employer also occupied another or dual capacity prior to, or at the time of the employee's industrial injury shall not permit the employee . . .¹⁰⁹ to bring an action at law for damages against the employer.

(This provision includes a limited number of qualifications that are not here pertinent.)

7. Punitive Damages in Tort.

Assume the Company in Hypothetical A is indeed found negligent for having failed to take any reasonable steps to reduce the earthquake risk. Is there any possibility that punitive damages could be awarded in resulting tort action? The leading precedent is the Ford Pinto case, Grimshaw v. Ford Motor Co.,¹¹⁰ which builds accurately enough on prior California opinions. Under California Civil Code § 3294, punitive damages are available if the plaintiff can show that the defendant is guilty of "oppression, fraud, or malice, express or implied." According to Grimshaw, "implied malice" does not require a showing that the defendant had a nasty purpose to harm any particular individual. Rather, "implied malice" includes a "conscious disregard of the probability that the actor's conduct will result in injury to others."

"The plaintiff must show that the defendant was aware of the probable dangerous consequences, and that he willfully and deliberately failed to avoid those consequences." In Grimshaw, what the Court regarded as impliedly malicious was that Ford had "balanced human lives against corporate profits," thus revealing an "institutional mentality . . . of callous indifference to public safety."¹¹¹

Taken for all it may be worth, Grimshaw permits awards of punitive damages whenever a defendant makes a deliberate decision not to invest in safety, so long as the jury--after the fact--regards that decision as clearly inappropriate. There are various limiting features in Grimshaw, however. First, the Pinto was evidently much more dangerous than other cars, American and foreign. It is not clear that this feature of excessive danger is present in Hypothetical A (or later hypotheticals). Secondly, the Grimshaw Court regarded the cost of safety to Ford as merely "nominal." (No more than \$15 a car--though this added up to \$10.9 million over a two-year period.) In the various hypotheticals, the cost of safety is obviously far more than nominal. Third, Grimshaw requires that injury be "probable," a "virtual certainty"¹¹² (which was true for the full fleet of Pintos). Yet earthquakes at any particular location are obviously "uncertain," a mere "possibility."

In all, in light of Grimshaw, punitive damages in Hypothetical A cannot be ruled out; but they remain unlikely.

8. Workers' Compensation Penalty

As far as injured employees are concerned, the only counterpart in workers' compensation to punitive damages in tort is the penalty of up to 50% of the compensation award for the employer's "serious and willful misconduct."¹¹³ (Until last year, that penalty could not exceed \$10,000. The ceiling has now been eliminated.) This "serious and willful" concept requires that the employer act (or not act) with knowledge that serious injury to employees is a probable result, or with a positive and active disregard for employee safety. See Hawaiian Pineapple Co. v. Industrial Accident Comm.¹¹⁴ Those considerations that make punitive damages possible but unlikely in a tort action on the facts of Hypothetical A make the workers' compensation penalty possible but unlikely as well.

HYPOTHETICAL B -- RELATED TO A REHABILITATED UNREINFORCED MASONRY HOTEL

The owner of a private residential hotel of unreinforced masonry knows that there is a significant risk of damage in an earthquake. The City has no program (as permitted by California law) to require upgrade of private buildings to a life-safety standard rather than full current Uniform Building Code compliance. Although the building owner is not required by the Code to do any rehabilitation, he chooses, on the advice of design professionals, to spend 10 percent of the money required for complete compliance with the current Code to achieve 80 percent safety. An earthquake occurs and there are some severe injuries, though substantially fewer

casualties than in other similar buildings where no rehabilitation had occurred.

On its face, this hypothetical involves the same kind of negligence balancing that was involved in Hypothetical B. Here the balancing concerns the additional work that the hotel owner could have done, but declined to do. The owner is possibly negligent. But the facts of Hypothetical B add the following complication: to what extent does the current Uniform Building Code, even though not applicable by its own terms, provide a kind of "quasi-standard" which a court could look to in interpreting the negligence test?

If a party violates a statute or ordinance that is directly applicable to him, and if the violation produces the kind of harm against which the statute or ordinance is designed to protect, then the violation is "negligence per se" in any suit brought by the accident victim. This rule of negligence per se was established in California as early as 1880 in Siemers v. Eisen,¹¹⁵ involving an ordinance requiring that horses be tied up when left on city streets. The rule of negligence per se has now been codified in California as Evidence Code § 669. In embracing this doctrine of negligence per se, California has placed itself in conformity with American tort law generally.

However, in Hypothetical B the problem is that the Building Code does not profess to apply retroactively: hence the landowner has no legal obligation to comply with it. The landowner does remain bound, however, by his common law obligation of reasonable care. Is there any way in which the new Code requirements can be rendered relevant to a "reasonable care" inquiry?¹¹⁶ The answer to this question is: possibly. In Clinkscales v. Carver,¹¹⁶ a motorist brought about an accident by failing to stop at a posted stop sign. The procedure which the city had followed, however, in approving the stop sign was legally defective. As a result, the motorist did not violate any actual valid law in running the stop sign. Nevertheless the California Supreme Court, in an opinion by Justice Traynor, found the motorist negligent.

Even if the conduct cannot be punished criminally because of irregularities in the adoption of the prohibitory provisions, the legislative standard may nevertheless apply if it is an appropriate measure for the defendant's conduct. When the court accepts the standard it rules in effect that the defendant's conduct falls below that of a reasonable man as the court conceives it. It does no more than it does in any ruling that certain acts or omissions amount as a matter of law to negligence. . . . If a through artery has been posted with stop-signs by the public authorities in the customary way and to all appearances by regular procedure, any reasonable man should know that the public naturally relies upon their observance.¹¹⁷

Clinkscales "helps" the plaintiffs in Hypothetical B by establishing that California law sometimes allows a plaintiff to rely on the defendant's non-compliance with a regulation that is itself not directly

applicable. In Clinkscales, however, it was the apparent propriety of the stop sign, combined with the reliance by motorists on the obligation that the stop sign suggested, that supported the Court's conclusion. These elements of apparent legality and consequential reliance are lacking in the Hypothetical B situation.

There are, however, additional (though non-California) cases in which subsequently enacted states or regulations have been regarded as relevant to the identification of the violation of tort law norms. Fall v. Esso Standard Oil Co.¹¹⁸ dealt with the federal Jones Act, which renders the owners of boats liable for injuries resulting from the "unseaworthy condition of the boat; a boat can be regarded as unseaworthy if it contains any "dangerous weapons." In Fall, an electrician was murdered by a crew member using a switchblade knife. After this accident occurred, Congress passed a statute prohibiting the sale or possession of the kind of switchblade knife that the crew member had wielded. The Court indicated that had the statute been in effect before the incident in question, the switchblade knife would necessarily be regarded as a "dangerous weapon," thus mandating a verdict in favor of the plaintiff. Because the statute was not then in effect, the Court concluded the jury was not required to find that the switchblade was a "dangerous weapon;" nevertheless, according to the Court, the subsequently adopted federal statute was at least a factor to be taken into account in determining whether it is "fair and reasonable" to characterize a switchblade knife as a liability-producing "dangerous weapon."

Two recent products liability cases, Josephs v. Harris Corp.¹¹⁹ and Hammond v. International Harvester Co.,¹²⁰ move in a similar direction. Both cases concern products manufactured for use on job sites: a printing press in Josephs, a loader tractor in Hammond. Each product was lacking a safety device that was arguably desirable. The question in each case was whether the absence of that safety device rendered the product "defective" for purposes of products liability law. In each case a regulation issued by the federal Occupational Safety and Health Administration required such a safety device; in each case, however, the OSHA regulation had been adopted subsequent to the manufacture of the product. In each case, the federal Court of Appeals regarded the regulation as affording evidence that was at least relevant to the question of defectiveness. The line of analysis in Josephs was rather narrow: while the product had been manufactured by the defendant prior to the date of the regulation, subsequent to the regulation's adoption it had been sold by the manufacturer (in a used condition) to the plaintiff's employer. The reasoning in Hammond is more interesting. The Court acknowledged that the OSHA regulations "do not directly govern the instant case because the tractor in question was manufactured at least six months prior to the effective date of the regulations." Nevertheless, the Court regarded the regulation as relevant insofar as it "illustrated . . . the importance" of the design feature which the product lacked. "OSHA's very decision to promulgate these regulations provides strong support for the proposition" that the safety feature is needed for safety.¹²¹ Hammond can be characterized as suggesting that the regulation, though not directly applicable, serves as kind of "expert testimony" on the issue of the safety feature's desirability.

In all, there is room for argument that current Uniform Building Code requirements can at least be considered by the jury in determining what a property owner is obliged to do in order to conform with negligence law's general standard of "reasonable care." One important factor, however, distinguishes Hypothetical B from the three cases that have been just discussed. The current Building Code deals with design features that should be included in new construction; given this purpose, the Code is obviously designed to strike a balance between the costs of new construction and the advantages of safety. However, reconstructing a building that has been in use for many years obviously involves costs that are not involved in the incorporation of safety features into new construction. Therefore, the trade-off judgments that are implicit in the current Building Code do not really seem directly relevant to the question of what the owner of an older building should really do. Because of this discrepancy between the "logic" of the current Code and the logic of reconstruction, the "expert testimony" theory relied on in Hammond may be unavailable in the Hypothetical B situation. It is thus unclear whether the current Building Code is legally relevant to the liability of the building owner in Hypothetical B.

Of course, even if the owner is negligent for not having "done more," the causation issue persists. See the wrinkles in causation law discussed above in II-B. Would "doing more" have in fact prevented these injuries from happening? This is a question of fact that would depend, in part, on the exact specification of what it is that the defendant should have done.

HYPOTHETICAL C -- ALSO RELATED TO A REHABILITATED UNREINFORCED MASONRY HOTEL

Same as above, but the City has a program, and the building rehabilitation meets the life-safety standards prescribed.

In this hypothetical, the hotel owner has complied with a seemingly pertinent city ordinance. The question is: to what extent does compliance with an applicable ordinance provide a building owner with a defense or rebuttal to what might otherwise be a valid claim of negligence? The answer provided by II-D is: no, unless California adopts Justice Linde's proposal. (See pp. 7-11.) If one assumes that the Linde proposal is accepted, then for Hypothetical C purposes, the question turns out to be: does the life-safety-standards program merely attempt to establish minimum standards, or does it ambitiously intend (as far as earthquake safety is concerned) to establish all the features that a "reasonably safe" building should contain? At this point, lawyers would need to argue about the process by which this program has been developed and adopted. In any event, even if the program does indeed fit into Justice Linde's analysis, all the plaintiff would need to do in order to escape the Linde "regulation defense" is to pinpoint some particular claim of negligent design that is not directly dealt with by the program.

HYPOTHETICAL D -- RELATED TO A NEW HIGH-RISE OFFICE BUILDING

The professionals designing a 10-story office building comply with the prescriptive standards in all local building codes as interpreted by the city staff. The professionals know, and advise the owner or builder, that greater safety could be achieved with state-of-the-art design and construction techniques at little (5%) additional cost, but the owner elects to minimize costs. The suburban city building department approves the design. After construction and occupancy, there is a moderate-to-strong earthquake, and an expert states that significantly greater injuries and damage to property of third parties (occupants and strangers) occurred because state-of-the-art techniques were not used.

A building owner is potentially liable for any negligence in its decisions, and this hypothetical suggests that the basic decision was rendered by the owner. Moreover, a "reasonableness" balancing process could easily suggest that the owner rendered a negligent choice. However, the "suburban city building department approves the design." Assuming that there was no impropriety in that approval, the building owner hence has complied with a relevant regulatory scheme. The question thus arises as to the relevance of this compliance to a claim of owner negligence. The analysis above has stated the general California rule to the effect that regulations establish merely a minimum standard. The most the building owner hoped to do is to persuade the court both that Justice Linde is correct and that the Code regulatory scheme is as ambitious in its intentions as is negligence law itself. The Uniform Building Code is itself drafted by an expert and prestigious quasi-public organization (the International Conference of Building Officials), and the Code is usually accused (if anything) of being too restrictive, rather than too lax. Nevertheless, interest groups are not without influence in lobbying with the Conference. In any event, local governments are frequently belated and incomplete in adopting the latest edition of the Code. If the locality's own Building Code has fallen behind the Uniform Code with respect to earthquake safety, then even Justice Linde would not accord much significance to the City's approval. And again, all the plaintiff would need to do to circumvent the Linde defense is to specify some element of negligence that the Code doesn't cover.

The hypothetical indicates that "state of the art" design would provide greater safety. Within the law of torts, the phrase "state of the art" is somewhat ambiguous. Sometimes it merely signifies that which is technologically feasible. In a negligence case, the plaintiff always needs to show a feasible alternative; the hypothetical's assumption of a "state of the art" design may merely indicate that such a feasible alternative exists.

Often, however, the "state of the art" phrase is used to signify industry custom. If there is a customary design which this building owner has declined to accept, what consequences follow? Most cases involving the relationship between custom and negligence concern situations in which a defendant has complied with a relevant custom.

Here the prevailing rule, accepted by California courts by the end of the nineteenth century (see Hennesey v. Bingham)¹²² and endorsed by Judge Learned Hand in his famous opinion in The T.J. Hooper¹²³ case, is that a defendant's compliance with custom is some evidence of non-negligence on the defendant's part, but is not conclusive on the question of no negligence. What about situations, however, in which the defendant has violated rather than complied with, a relevant custom? It might be argued that while compliance with custom tends to raise questions (for example, is a safer alternative feasible?), violation of custom tends to lower questions (by establishing, for example, that a safer alternative is feasible). If so, then such a violation should perhaps be regarded as conclusive on the issue of the defendant's negligence. The general rule nationally, however, is that noncompliance with custom is merely evidence of negligence rather than conclusive proof.¹²⁴ Language in California opinions seemingly has accepted the national position.¹²⁵ Even given this position, however, one can assume that a jury would be greatly influenced by a plaintiff's showing that the defendant has departed from a pertinent custom. A defendant could, of course, blunt that influence by showing that his departure entailed mere "non-conformity" rather than actual "sub-conformity"--i.e., that the defendant's alternative strategy was dictated by special circumstances, or that this strategy was itself as safe or safer than the general custom. But the facts of Hypothetical D seem to preclude such a showing.

The facts of the hypothetical address the causation issue by specifying that "significantly greater injuries" were suffered because of the owner's failure to adopt state-of-the-art techniques. If that failure is negligent, then the victims of those "greater injuries" can prove causation.

Lurking in the background of this hypothetical--but only in the background--is the question of the standards that relate to the identification of architectural malpractice. In the hypothetical, the architects have given the owner appropriate advice as to the safety option's available to the owner. It was then the owner's choice to pursue the less earthquake-proof design.

Had the architects actually recommended the less safe design and the owner merely acceded to that recommendation, the architects might be vulnerable to a claim of malpractice. California cases have established the following ground rules for architectural malpractice cases. First of all, an architect does operate under tort-law duties that extend to third persons who suffer injury even after the architect's work has been completed and accepted by the building owner; there is no doctrine of "privity" that prevents such third parties from suing the negligent architect.¹²⁶ A 1953 Court of Appeal opinion, however, indicates that an architectural malpractice case resembles a medical malpractice case in the sense that the plaintiff must prove malpractice with the help of expert testimony. See Paxton v. County of Alameda.¹²⁷ Moreover, Paxton indicates that the expert witness must establish that the architect failed to exercise the care that is typical of other architects from the "same locality." The "locality" rule is likewise derived from medical malpractice cases. In medical malpractice, moreover, California cases

have subsequently made clear that it is sufficient if experts identify the standard of care in either the same locality or in "similar localities."¹²⁸ The "similar locality" rule, having been approved for medical malpractice cases, would almost surely be carried over by California courts to architectural malpractice.

Again, however, in this hypothetical the architects have merely provided the owner with appropriate information and then have evidently incorporated the owner's decisions into the ultimate building design. If a jury were convinced that the judgment incorporated into that design is unreasonable, can the architects be found negligent for drafting that design pursuant to the instructions of their client? In a number of products liability cases, a manufacturer has omitted some safety feature at the request of the purchaser (often an employer); a third party (often an employee) then suffers an injury that the safety feature would have prevented. In these cases, it is not uncommon for manufacturers to be found liable, even though the product was sold in conformity to the preferences of the buyer.¹²⁹ A "buyer specification" defense has been judiciously recognized primarily when the buyer is the government itself and when the government-buyer is more knowledgeable about the design hazards than is the manufacturer.¹³⁰ By contrast, the private building owner in Hypothetical IV is not public-interest-minded in a way that a government agency is, and the architects presumably appreciate the design hazards more keenly than the owner does. Nevertheless, holdings like Hammond may well be limited to the special context of products liability, where liability is especially "strict" (or at least rigorous). As far as architects are concerned, the argument seems overwhelmingly strong that they are permitted--indeed required--to comply with the preferences of their client. Tort law may wish to make sure that architects inform clients of safety hazards in proposing alternative designs. But if a client, armed with such information, chooses a particular design, the architect who drafts the plans that implement that choice is almost certainly free of liability.

HYPOTHETICAL E -- RELATED TO A HOSPITAL FACILITY

The private hospital board knows that its facilities are located in an area where violent earthquake shaking must be anticipated. During a moderate-to-large earthquake, the resulting ground shaking and ground displacement cause dysfunctions in use, e.g., rolling beds, destruction of pharmaceuticals, and failure of life support systems that result in injuries and death to patients and others. In addition, the hospital building is unusable for the duration of the emergency.

Here one must separate out the original injuries from the later misfortunes resulting from the unavailability of the hospital facilities. As for the former, it would appear that an ordinary negligence analysis should be resorted to. The rather open-ended factual question is: what reasonable precautions were there that the hospital could have adopted that would have minimized the harm immediately resulting from the earthquake?

At this point, however, one should pin down the measure of the obligation running from a private hospital to its patients. At one time, non-profit hospitals were beneficiaries of the rule of charitable immunity, a rule which relieved them of liability even for their negligence. That immunity has now been abandoned, in California and elsewhere. According to the California Supreme Court in Wood v. Samaritan Institution, Inc.:

The extent and character of the care that a hospital owes its patients depends on the circumstances of each particular case. A private hospital owes its patients the duty of protection, and must exercise such reasonable care toward a patient as his known condition may require. The measure of duty of a hospital is to exercise that degree of care, skill and diligence used by hospitals generally in that community, and required by the express or implied contract of the undertaking.¹³¹

The "contract" element in Wood's formulation of the negligence liability standard raises the question of whether a disclaimer of negligence liability in the contract between hospital and patient would be upheld by the courts. A public hospital's disclaimer was invalidated in the famous Tunkl case, described above at pages 14-15. The shift from public to private hospital improves the disclaimer's chances in one way: no longer can the patient argue that he is a low-income person compelled by his indigency to accept the services of the only charitable hospital in the vicinity. In another way, however, the shift seems to weaken the disclaimer: no longer can the hospital argue that disclaimers are a reasonable way for it to restrain the cost of the charitable services that it provides and hence to increase the number of low income patients that it is able to serve. Given the Tunkl Court's invalidation of the UCLA disclaimer, and given the standoff in the shift from public to private hospital, a reasonable guess is that the private hospital's disclaimer would be held invalid as well.

As for the unavailability of the hospital for the duration of the emergency, one needs to know to what extent the hospital is under an obligation to provide continuing services. If the hospital has entered into contracts with its patients promising that the hospital will remain available to service the patient's continuing needs, then the hospital would be vulnerable to suit for breach of contract. However, an employee of a Los Angeles law firm that represents a number of major hospitals in Southern California has stated that the standard hospital contract is utterly lacking in any provision that includes such a promise. Note, however, the excerpt from the Wood opinion quoted above which makes clear that there can be "implied" terms in the contract between hospital and patient. Clearly enough, if a patient enters a hospital with a medical problem that is expected to require continued hospitalization, the implied understanding between patient and hospital is that the hospital will be available to take care of the patient (so

long, of course, as the patient complies with his part of the bargain by paying his bills).

Even if a court concludes, however, that the contract includes an implied promise of the hospital's continued availability, the court might well characterize that promise as one obliging the hospital merely to make reasonable efforts to assure its availability. Moreover, even if the hospital-patient contract includes an express provision in which the hospital promises to provide continued services, should an actual earthquake prevent the hospital from complying with that promise, the hospital would argue the doctrine of "impossibility" or "impracticability" as a defense against a strict-liability breach of contract claim. According to the Second Restatement of Contracts:

Where, after a contract is made, a party's performance is made impracticable without his fault by the occurrence of an event the non-occurrence of which was a basic assumption on which the contract was made, his duty to render that performance is discharged, unless the language or the circumstances indicate the contrary.¹³²

The "impracticability" defense has been accepted in California in cases such as Oosten v. Hay Haulers Dairy Employees and Helpers Union. In Oosten, the Supreme Court incorporated Corbin's treatment of impossibility:

We can not always be sure what "causes are beyond the control" of the contractor. Many fires can be prevented by the use of foresight and sufficient expenditure. Most strikes can be avoided by a judicious yielding or by an abject surrender to demands. No contractor is excused . . . unless he shows affirmatively . . . that, in spite of skill, diligence and good faith on his part, performance became impossible or unreasonably expensive.¹³³

There are no California cases bearing on whether earthquakes or acts of God count as a form of impossibility. A review of cases nationwide concludes that "unforeseeable" acts of God tend to be recognized as a form of impossibility.¹³⁴

A contract analysis has been pursued above; note, however, all the ways in which that analysis incorporates basic tort ideas. "Impracticability" is a defense under the Restatement only if the party invoking the defense has been "without fault;" under Oosten, the party claiming the defense must show that performance became impossible "in spite of skill, diligence and good faith on his part;" the case law suggests that only "unforeseeable" acts of God should be regarded as justifying an impossibility finding. Return now to the law of torts proper. That the hospital facilities are "unuseable for the duration of the emergency" may not affirmatively cause harm; nevertheless it prevents patients from receiving badly needed medical services. Does

tort law impose on the hospital the "affirmative duty" to provide these benefits? Recognized exceptions to the general no-affirmative-duty rule have been discussed in Part II-F (pp. 13-14). The "undertaking" exception and the "special relationship" exceptions are most pertinent here. Plainly, a patient who places himself in a hospital's care is "worse off" if he is suddenly abandoned by that hospital than he would have been had he never been accepted by the hospital in the first place. And if a doctor's relationship with his patient is sufficiently "special" to justify imposing an affirmative duty, the hospital's "relationship" with that patient is almost certainly "special" enough as well.

It seems reasonably clear, therefore, that a hospital is subject to a tort law "affirmative duty" to provide the continued service that its patients may need. That affirmative duty, however, is not a duty of strict liability; rather, it is a duty of reasonableness, of non-negligence. To borrow language from a leading California opinion concerning affirmative duties, the defendant is not required to "render a perfect performance; [it needs] only exercise that reasonable degree of skill, knowledge, and care ordinarily possessed and exercised by [professionals] under similar circumstances." Tarasoff v. Regents of University of California.¹³⁵

In sum, Hypothetical E can be approached from a contract perspective, pursuant to which the hospital's implied promise is either characterized in terms of reasonableness or qualified by the defense of impracticability. Or that hypothetical can be approached from the perspective of tort, pursuant to which the hospital's "affirmative duty" is likewise measured in terms of reasonableness. As the analysis in II-B suggested, for purposes of defendant engaging in a long-run activity, an earthquake in California certainly seems reasonably foreseeable. The hospital's liability would thus seemingly depend on whether it is "unreasonable" not to have developed a "reasonable" program of preparedness to cover the situation described in Hypothetical E. There is a wrinkle, however. All the existing "affirmative duty" cases concern what a defendant should do after an emergency arises. Here, the claim may be that the hospital should have developed some preparedness plan in anticipation of a possible emergency. To hold the hospital liable would thus require a discrete extension of affirmative duty law. But a reasonable guess is that the California Supreme Court would approve such an extension.

This discussion can thus close with a striking if tentatively formulated conclusion: the hospital may be vulnerable to a finding of negligence if it has failed to develop and implement a reasonable program of earthquake preparedness.

Various negligence arguments have been herein discussed. Once some particular claim of negligence is affirmed, a court then would need to consider whether that negligence was a but-for cause of the plaintiff's injuries.

HYPOTHETICAL F -- RELATED TO A PRIVATE NATURAL GAS UTILITY

The private utility providing natural gas discovers, through a study, that, in a moderate-to-large earthquake, its emergency back-up systems would not be adequate to ensure continuing provision of natural gas for residential heating. The utility takes no effective steps to improve its emergency systems, and in the subsequent earthquake the system fails during the winter, leading to the loss of life of some elderly, infirm and infants, and severe hardships for all affected users.

Much of the discussion below will rest on the assumption that the gas company has been negligent in having "taken no effective steps to improve its emergency systems." That assumption needs to be documented, of course, by showing that the failure to take these steps was indeed negligent; that is, that the (safety and other) advantages of continued service would outweigh the (monetary and other) costs of developing backups systems that would insure service. All of the "tort" theories discussed below would require a demonstration of the gas company's negligence. (However, if the homeowner somehow or other is relying on either contract or regulation as the source of the company's obligation, it is not entirely clear that the need to show negligence would apply. Still, any obligation imposed by either contract or regulation might be explicitly couched in the language of "reasonableness;" and even if contract or regulation seemingly imposes on the gas company a generally worded obligation to provide service, a court might well interpret that obligation in "reasonableness" terms).

In this hypothetical, in a sense the private utility has not actually "caused" harm. Rather, the withdrawal of its services has permitted or enabled harm to occur. The question is: to what extent is the private utility under an "affirmative duty" to provide continued gas service. There are a number of theories on which a plaintiff could rely--all of them, alas, complicated and uncertain.

There is, first of all, a special public-utility doctrine concerning the "duty to serve." However, this doctrine relates mainly to a public utility's deliberate refusal (for any of a variety of reasons) to provide service to particular households at particular locations. In duty-to-serve cases involving unintended interruptions caused by events like storms, fire, war, "the utility will be relieved [of its duty to serve] for a period reasonably necessary for the restoration of the service." This, at least, is the explanation given in the most thorough law-review article on the subject.¹³⁶ The judicial authority supporting this statement is scant, however.¹³⁷

Putting aside the special "duty to serve" doctrine, there is general case law on the liability of electric companies for harms resulting from unintended interruptions in the supply of electricity. In Arkansas Power & Light Co. v. Abboud¹³⁸ for example, the power company was held liable for its negligent failure properly to inspect wires, resulting in a short circuit; in Senderoff v. Housatonic Public

Service Co.¹³⁹ a power company was found not liable because of the absence of any negligence on its part. An opinion of the California Supreme Court affirming a rule of liability-for-negligence is Langley v. Pacific Gas & Electric Co.¹⁴⁰ In Langley, the evidence clearly showed that the electric company was in no way initially responsible for the interruption of service. The Court nevertheless found the electric company negligent in failing promptly to notify the plaintiff of the impending interruption, so that the plaintiff could "obtain a substitute supply."

However, when the interruption has been immediately caused by an act of God, the cases (none of them from California) have uniformly denied the electric company's liability.¹⁴¹ In Monolith Portland Midwest Co. v. Western Public Service Co.,¹⁴² the consumer's contract with the electric company indicated that the company would not be responsible for interruptions due to causes "beyond its control;" the Court held that a bolt of lightning was such a cause. In Florida Power Corp. v. Tallahassee,¹⁴³ the power company's contract with the city relieved the company of liability when service was interrupted by an "act of God;" the Court held that a hurricane was such an "act". In none of these cases, however, was there adequate proof of any negligence on the part of the electric company that could have cushioned the consequences of the natural force. They hence do not preclude a Chidester-type argument that liability is appropriate when negligence and an act of God combine in the bringing about of harm.

Assuming that Hypothetical F arises in a typical California setting, the gas company does have a direct contractual relationship with the household in the sense that the household is billed for and pays for its monthly supply. Nevertheless, in another sense the basic contract consists of the "tariff" agreed to by the gas company and the regulatory authority. In California it is typical for such tariffs to excuse interruptions of service if they are caused by natural disasters or by conditions beyond the gas company's control. A court would need to interpret this "excuse," however. Does it really apply if the electric company has been guilty of preparatory or concurrent negligence? Possibly not, since given such negligence the interruption was not really "beyond" the company's "control."

Hypothetical F still differs from both Hypothetical A and from Chidester insofar as it involves an issue of "affirmative duty". And at this point the waterworks cases become relevant. Water companies have frequently been sued for failing to provide water to water mains, resulting in a homeowner's inability to put out a fire. The leading opinion nationwide is H.R. Moch Co. v. Rensselaer Water Co.,¹⁴⁴ a 1928 opinion authored by Chief Judge Cardozo, holding that the homeowner cannot recover. Looked at from the point of view of contract, the homeowner is not a party to the contract between waterworks and city, nor, according to Moch, is the homeowner an "intended third party beneficiary" of that contract who could sue for contractual noncompliance. Looked at from the point of view of tort, the Moch opinion found no reason to depart from the general rule denying the

existence of affirmative duties. Even before Moch, the California Supreme Court had reached a liability-denying result in a fire hydrant case in Niehaus Brothers Co. v. Contra Costa Water Co.,¹⁴⁵ Nationwide, the Moch result has been followed in all states except four. (The leading opinion affirming liability is Doyle v. South Pittsburgh Water Co.)¹⁴⁶ The most recent California opinion affirming the denial of liability--and making clear, moreover, that this result applies even when the plaintiff explicitly sues in tort and alleges the negligence of the waterworks--is Luis v. Orcutt Town Water Co.¹⁴⁷

From both a contract and tort perspective, the general rule of non-liability in the waterworks cases seems dubious. For contract purposes, it would be easy enough to regard the homeowner as an "intended third-party beneficiary" of the water company's contract with the city. For tort purposes, homeowners rely in a general (if implicit) way on the water company's undertaking to provide service at fire hydrants; and since this reliance makes the homeowner "worse off" if that undertaking is negligently performed, it seems easy to construct an argument supporting the existence of an affirmative duty. Moreover, the "relationship" between utility and customer may be sufficiently "special" for purposes of recognizing an affirmative duty. Yet even if the waterworks rule of no liability seems dubious, the rule remains on the books, and would seem to apply by analogy to Hypothetical F, where, apart from Moch, there would be a strong reliance argument in favor of an affirmative duty.

Assessing Hypothetical F is therefore difficult. Given the waterworks cases, and given the absence of cases holding public utilities liable for interruptions immediately resulting from acts of God, one is required to say that under existing law liability is unlikely. Yet given the California Supreme Court's recently expressed reservations about the general rule of no-affirmative-duties, given the strength of the undertaking-reliance argument in favor of an affirmative duty, and given the willingness of many courts (although not in the public utility context) to impose liability when negligence concurs with an act of God, one can perhaps predict revisions in California law that would enable plaintiffs to recover under Hypothetical F in the aftermath of an earthquake.

Of course, in order for plaintiffs to recover the court would need to find, on the causation issue, that if the utility had taken "effective steps" the existing system would not have failed.

HYPOTHETICAL G --- RELATED TO A GOVERNMENTAL EARTHQUAKE WATCH

A government agency issues a watch that the chance of an earthquake in the area has increased from 1 percent per year to 20 percent per year. The State Office of Emergency Services advises people and companies that they should prepare for a possible earthquake, and should take steps necessary for self-sufficiency for three days. The company does nothing. A major earthquake occurs and traps employees and visitors for

three days. Injuries and illnesses are aggravated, there is extreme distress, and some deaths result from inadequate first aid supplies, food and water.

This hypothetical is ambiguous as to the meaning of "trap." The hypothetical may signify that a collapse within the building itself prevents "employees and visitors" from leaving. If so, then the question is: can that collapse be attributed to any negligence on the part of the company? If it can be, then the company is liable for all the "proximate" consequences of its negligence; and surely, the consequences in Hypothetical G may seem "proximate" enough. (See, however, the discussion of voluntariness at the end of this section).

It may be, however, that it is hazards outside the building that prevent "employees and visitors" from leaving. If this is the meaning of "trap," then the company is liable only if it is under an "affirmative duty" to arrange for self-sufficiency. "Affirmative duty" would also be the test of liability if the "trapping" is caused by the collapse of the building itself, but if it is not true that this trapping can be associated with any negligence on the company's part.

Under what circumstances, then, does the company have an "affirmative duty." Whether the "trap" results from conditions inside or outside of the building may make a difference on the "affirmative duty" question under existing law. As will be demonstrated in the discussion of Hypothetical K, if a defendant causes--even though non-negligently--a situation of danger, the defendant then is evidently under an affirmative duty to take reasonable steps to minimize the danger. On the surface, that doctrine would apply in Hypothetical G if it is the non-negligent collapse of the building that produces the trap.

This line of analysis would not apply, however, if it is only "outside" conditions that effectively trap people inside the building. What other theories of "affirmative duty" might be applicable here? As noted, affirmative duties exist when there is the right kind of "special relationship" between defendant and plaintiff. The relationship of employer to employee is commonly regarded as one that generates an affirmative obligation,¹⁴⁸ and it may well be the relationship between a commercial establishment and its customers is sufficiently "special" to justify an affirmative duty.¹⁴⁹ In these cases, however, it is typically some condition in the employer's or retailer's premises that brings about the original danger.¹⁵⁰ If the danger is generated solely by external forces, it is less clear that an affirmative duty would be found.

The "advice" from the State Office is also of possible significance. When there is a statute imposing on a class of persons an obligation to render aid, courts will sometimes rely on the statute in recognizing an obligation that is enforceable in a tort action for damages. See, e.g. the California case of Summers v. Dominguez.¹⁵¹ Obviously, "advice" from the State Office is not the same as a statute or regulation. Still, that "advice" suggests that the authority of

government stands behind the notion of an affirmative duty. Also, the specificity of that advice could be relied on by courts in providing a clear definition of the affirmative duty. (As Tarasoff notes, one of the arguments against recognizing affirmative duties is that they seem potentially limitless). One can at least say that the State advice is a factor favoring recognition of an affirmative duty; in combination with other factors, it might well tip the balance.

The previous paragraphs, in considering tort law, have primarily concerned the "visitor"-victim. How about employees? The employee in question is "trapped" and hence prevented from leaving the work site even though the work day is ended. In these circumstances, is it the law of torts or instead the law of workers' compensation that determines the employee's opportunity to recover? If workers' compensation, the employee would appear to have a certain--but limited--recovery. If tort, then full tort damages are available, but only if the employee can establish the existence in violation of an affirmative tort duty. Under workers' compensation, the employee must show that his injury occurred "in the course of" his employment. It is well established, however, that "in the course of" includes not only the time of the work day itself, but also a reasonable margin of time and space necessary for the arrival to or departure from work. In general, injuries sustained by an employee upon the employer's premises while going to or from his work assignment are generally deemed to have arisen "in the course of" and also "arising out of" the employment.¹⁵² If the employee is physically trapped in the building by the building's own collapse, one can be confident that any resulting injuries involve his employee role and hence are covered by workers' compensation. Even if he is physically trapped in the building by the collapse or something just outside of the building, he is probably covered.

But here's the rub. Thus far, the analysis of Hypothetical G has taken at physical face value the hypothetical's statement that people are "trapped" within the building. In all likelihood, however, they are "trapped" only in the figurative sense that dangers outside the building lead them to believe that they are better off remaining inside. The regular hours for shopping or for working are over; yet they choose to remain within the building. In a sense, at some point they may even become legal trespassers. The trespass defense of "necessity" undoubtedly prevents the building owner from forcing them to leave. Nevertheless, their voluntary presence in the store or workplace after the close of hours considerably weakens their right to insist that their status as customer or employee entitles them to tort affirmative duties or to workers' compensation recoveries. Accordingly, their claims cannot be regarded as more than uncertain. (The causation issue, however, seems no problem. The language of Hypothetical G implies the affirmative on the issue of but-for cause: the adverse consequences described are a "result" of inadequate supplies.)

HYPOTHETICAL H -- RELATED TO MOVIE THEATER PARAPETS

A movie theater is located in an area of known seismic risk. The number and location of emergency exits conform to local fire codes. An earthquake occurs and half of the exits are blocked due to falling parapets and marquees. People panic and some people are crushed by the frantic occupants while attempting to leave the building.

At the first level, this hypothetical calls for a negligence analysis. Given the foreseeability of an earthquake that is implicit in the hypothetical's statement that the theater is "located in an area of known seismic risk," is it negligent to have a limited number of emergency exits that are capable of being blocked by falling parapets and marquees? One needs to balance the limited but still foreseeable risk against the costs of risk prevention. Adding or relocating doors may well be quite inconvenient. Parapets and marquees are largely ornamental, however. So long as there is a sufficiently foreseeable earthquake risk, the combination of parapets and doors would at least present enough evidence of negligence to justify sending the case to the jury.

In this hypothetical, however, the issue again arises of the significance to be attached to the defendant's conformity to the local Fire Code. Given this hypothetical's facts, it is doubtful that compliance would be highly significant. The Code simply does not address the problem presented here. The Code is concerned with protection against fire; yet the plaintiffs' negligence argument here relates to the risk of earthquakes. Moreover, while the Fire Code may confer approval on the number and location of emergency exits, it presumably says nothing about the proximity of those exits to parapets and marquees. The Code is thus largely irrelevant to the question of the combination of exits and parapets that provides the substance of the plaintiffs' negligence claim.

Finally, the question emerges of whether the victim's recovery should be precluded or reduced by virtue of the "panicky" and "frantic" behavior of the theater occupants. If it is the victim himself who has "panicked," the question may be one of contributory or comparative negligence. The victim's behavior is contributorily negligent if it runs an unreasonable risk of injury to himself. When external events impose an "emergency" upon a person, however, the law of torts evaluates his behavior forgivingly, taking into account

that the actor is left no time for thought, or is reasonably so disturbed or excited, that he cannot weigh alternative courses of action, and must make a speedy decision, based very largely upon impulse or guess.¹⁵³

A statement of California's version of emergency doctrine can be found in the Supreme Court's opinion in Leo v. Dunham:

The doctrine has been variously characterized as the "sudden peril rule," . . . the "imminent peril doctrine," . . . and the "emergency doctrine" However, under the cases and the authorities, a person who, without negligence on his part, is suddenly and unexpectedly confronted with peril, arising from either the actual presence or appearance, of imminent danger to himself or to others, is not expected nor required to use the same judgment and prudence that is required of him in the exercise of ordinary care in calmer and more deliberate moments.¹⁵⁴

The contributory negligence of the victim is thus a question that would go to the jury under "emergency" instructions, and it would not be surprising if the jury found no contributory negligence at all. Even assuming that the jury does find contributory negligence, under the comparative negligence doctrine of Li v. Yellow Cab Co.,¹⁵⁵ the plaintiff's contributory negligence serves merely to reduce rather than to eliminate the plaintiff's recovery. It is up to the jury to establish the proportionate negligence belonging to each of the two parties. Given these facts, any contributory negligence on the part of the victim is hardly egregious; by the same token, however, any negligence on the part of the movie theater is likewise lacking in egregiousness. No generalization is thus possible as to how the jury would apportion fault between plaintiff and defendant.

It is more likely, however, that the "panic" that leads to the victim's injury is the panic of patrons other than the victim himself. In the victim's suit against a movie theater, the question then is whether those other patrons' panic is an "intervening cause" or "supervening cause" that eliminates the victim's suit against the movie theater. In all likelihood, the patron's panicky conduct would not be regarded as a liability-defeating intervening cause. An intervening cause is most likely to be taken seriously when it involves criminal or intentional misconduct.¹⁵⁶ Here, the behavior of the patrons is at best negligent, and (given the discussion above) may be even less than negligent. Secondly, the conduct of the patrons is a "dependent" intervening cause (rather than an "independent" intervening cause) in the sense that that conduct would never have occurred but for the (assumed) original negligence of the defendant. A dependent intervening cause is less likely to be regarded as breaking the chain of causation running from the defendant's negligence to the plaintiff's injury.¹⁵⁷ Additionally, the primary test for intervening cause is that of "foreseeability."¹⁵⁸ Given the blocking of the exits, the panic of the patrons seems eminently foreseeable. In Champagne v. A. Hamburger & Sons,¹⁵⁹ an elevator packed with people suddenly fell several stories on account of the property owner's negligence. The plaintiff's injury may have been caused by being trampled on by fellow passengers who were attempting to escape from the elevator. Even if so, the California Supreme Court believed that the defendant could be properly held liable.

The intervening act of the crowd would not break the causal connection between the negligent act of operating the elevator

in a crowded condition and the injuries sustained by plaintiff, if such intervening act was one which might have been foreseen as likely or probable to occur as the result of the original negligence. . . . It needs no discussion to point out that where there is a sudden fall several stories to the bottom of its shaft of a crowded elevator the natural and probable result would be that its occupants would be overcome with sudden fear and fright; that there would be immediately created a condition of panic under which the natural tendency of the crowd would be to rush and struggle to get out, and that some, more particularly the weaker, might fall or be thrown down and involuntarily injured in the struggle; this might be expected as a natural consequence.¹⁶⁰

Given the holding and reasoning in Champagne, it seems clear that if the victim can establish the theater owner's negligence, the doctrine of intervening cause would not be available to preclude a recovery.

HYPOTHETICAL I -- RELATED TO ON-SITE STORAGE OF HAZARDOUS MATERIALS

Several electronics companies have on-site storage of hazardous materials, including solvents and acid plating solutions. The storage conforms to all pertinent state and local regulations. However, these standards do not require secondary containment facilities or above ground containers. Earthquake resistant design is specified in the Uniform Building Code. A major earthquake occurs, some storage vessels rupture and many pipelines and pipe-vessel connections fail. The materials contaminate the air, as well as leak into storm drains, sewers and the ground. Illnesses, fishkills, and sewage treatment disruption occur due to the air and water pollution. Two months later, water supply agency monitors determine that their ground water resources have been contaminated for an indefinite period.

Once again, the question of negligence arises. Is it negligent to fail to provide secondary containment facilities or above ground containers? It is specified that the techniques of storage here "conform to all pertinent state and local regulations." Unless, however, the regulatory scheme is unusually comprehensive and ambitious, California courts will apparently hold that the regulations merely establish minimum standards; hence a jury would be entitled to find negligence notwithstanding the defendant's compliance with those regulations.

It is unclear as to what is meant by the statement that "earthquake resistant design is specified in the Uniform Building Code." Have the electronics companies complied with the specifications, or have they ignored them? If the later, then the companies are negligent per se, at least if the local jurisdiction has adopted the relevant Code provision. The Code apart, under an ordinary negligence analysis the judge or jury

is required to balance the risks of contamination against the cost of rendering the storage of the materials more nearly earthquake proof. Given the pervasive harms that could be caused by the release of those hazardous materials, the level of precautions which the negligence doctrine would require the defendant to accept would be particularly high: courts might well conclude that the defendant is under an obligation of "the highest care and diligence."¹⁶¹

There is a real possibility, therefore, that the company will be found negligent on the facts of Hypothetical I. If the company was negligent, a court will then need to determine whether the specific negligence was a but-for cause of the rupture and subsequent contamination.

Assume no negligence, however. Is there any theory of strict liability which might be binding on the companies? A famous English case on strict liability is Rylands v. Fletcher.¹⁶² Two tests emerge from the Rylands opinions: that a defendant is strictly liable for a "non-natural use" of his property; and that a person is strictly liable if "he brings, or accumulates, on his land anything which, if it should escape, may cause damage to his neighbor."

In 1934, the American Law Institute, relying in part on Rylands in developing the First Restatement of Torts, spelled out a rule of strict liability for the "miscarriage of ultrahazardous activities carefully carried on." An activity is ultrahazardous if it "necessarily involves a risk of serious harm to the person, land or chattels of others which cannot be eliminated by the exercise of the utmost care, and . . . is not a matter of common usage."¹⁶³ The Second Restatement has retitled this doctrine as "abnormally dangerous activities." Under the Second Restatement, a number of "factors" are to be "considered" in determining whether an activity is abnormally dangerous. These factors include "whether the activity invokes a high degree of risk," "whether the risk cannot be eliminated by the exercise of reasonable care," "whether the activity is not a matter of common usage," "whether the activity is inappropriate to the place where it is carried on," and "the value of the activity to the community."¹⁶⁴

A leading California Supreme Court opinion in 1948 adopted the First Restatement's strict liability rule, and applied it to fumigation with a deadly gas.¹⁶⁵ It is not clear whether California courts would regard the Second Restatement as an improvement over the First. (Some courts have regarded the Second Restatement as inferior.)¹⁶⁶ Nor is it clear whether California courts have ever really adopted either of the rules in Rylands. As a recent footnote in a Court of Appeal opinion points out,

We note that although it is not certain what applicability the principle of the celebrated English case of Fletcher v. Rylands . . . has in California, . . . the emphasis in that doctrine on the "escape" of substances and "non-natural" uses

of the land has not been followed¹⁶⁷ by California courts in the imposition of strict liability.

One can catalog the activities that have been reviewed by California opinions from the perspective of the ultrahazardous rule. Boring a well is evidently regarded as ultrahazardous.¹⁶⁸ Deadly fumigation is, as noted, ultrahazardous.¹⁶⁹ Firing a solid fuel rocket motor is an ultrahazardous activity.¹⁷⁰ A fireworks display is not ultrahazardous, however.¹⁷¹ Maintaining electric power lines is not an ultrahazardous activity.¹⁷² Blasting is ultrahazardous, at least if undertaken in a populated area;¹⁷³ but subterranean tunneling¹⁷⁴ is not ultrahazardous.¹⁷⁵ Nor is flying an airplane ultra-hazardous.¹⁷⁶ Nor is the discharge of firearms.

Turning to the facts in Hypothetical I, one can take note Lipson v. Superior Court,¹⁷⁷ a recent California Supreme Court opinion that at least implicates the issue of whether the storage of hazardous chemicals by a manufacturer counts as an ultrahazardous activity. However, since the Lipson opinion primarily dealt with the defense of assumption of risk, the Court had no opportunity to resolve the ultrahazardous issue. Looking outside of California, however, one can locate the Fifth Circuit's recent opinion in Ashland Oil, Inc. v. Miller Oil Purchasing Co.,¹⁷⁸ in which the Court held that the disposal of hazardous wastes is ultrahazardous. Also, the Fifth Circuit cited a Louisiana Supreme Court opinion holding that "the storage of [a] dangerous, highly poisonous gas" is ultrahazardous.¹⁷⁹ Depending on the plaintiff's ability to marshal the relevant facts concerning the storage of "acid plating solutions," therefore, a court might well decide that this activity is ultrahazardous.

The next question is: whether strict liability indeed applies if the "miscarriage" of the activity is due to an earthquake. In Kall v. Carruthers,¹⁸⁰ a property owner was bringing water upon his property by artificial means for irrigation purposes; a portion of the water was escaping, to the injury of the adjoining property. The Court found all of this tortious and hence enjoined, relying on a combination of Rylands and the tort doctrine of "nuisance." According to the Court:

But confining ourselves for the present to [the] relation [of Rylands] to the . . . question [of the escape of water], we think we may say the doctrine is generally accepted both here and in England, with the modification that an act of God may be interposed as a defense, such as extraordinary disturbances¹⁸¹ of the elements resulting in floods and earthquakes.

For this "modification" the Court of Appeal relied on the Supreme Court's opinion in Sutliff v. Sweetwater Water Co.¹⁸² In Sutliff an extreme flood ended up breaking the defendant's reservoir, resulting in injury to the plaintiff's property. The trial court judge had found no negligence, by virtue of his perception that the flood had been "extraordinary and unprecedented," and that as such "it could not reasonably have been anticipated or foreseen" by the reservoir owner.

The Supreme Court, having affirmed this finding of no negligence, was required to consider the strict liability question. One part of the Court's opinion seemingly rejects the Rylands doctrine, at least in its application to reservoirs. (This is noteworthy, since Rylands itself had been a reservoir case.) But the Court, in the alternative, chose to "distinguish" Rylands, by virtue of the Court's assessment that "the proximate and immediate cause of the flooding of the plaintiff's land . . . was not the existence of the defendant's reservoir . . . , but the overwhelming of the reservoir by an agency beyond the defendant's control, in fact, in this case, beyond human control."¹⁸³

As a contrast to the 1920 Sutliff opinion, however, one can take note of § 522 of the Restatement, dealing with the "proximate cause" doctrine in its relationship to the rule of strict liability for ultrahazardous activities. According to that section, the party carrying on that activity is liable even though the harm is caused by the "operation of a force of nature" and even though that natural force is "unexpectedable."¹⁸⁴ One can also remember, also, that in its 1948 Luthringer opinion the Supreme Court had conferred its general approval on the Restatement (although not alluding to this particular provision). Whether there is an "earthquake" defense to a strict-liability ultrahazardous claim must therefore be regarded as an open question. Consider, however, the possibility that the hazardous materials in Hypothetical I are stored in a way that renders them vulnerable to an earthquake but not to other, more common natural conditions. If this is so, then the unlikelihood of an earthquake reduces the probability of harm in a way that weakens the argument that the activity is indeed "ultrahazardous" or "abnormally dangerous." Negligence law requires merely minimally "foreseeable" harm. Strict liability more nearly requires "probable" harm; consider the language in the Second Restatement, indicating the importance of "whether the activity invokes a high degree of risk of some harm." If the storage of hazardous materials in Hypothetical I is susceptible to disaster only if an earthquake occurs, it is not very likely that a court would regard that storage as subject to strict liability.

Assuming some basis for liability in Hypothetical I, (either negligence or strict liability), a number of questions could arise concerning damages that can properly be recovered. "Illnesses" would surely be compensable. The killing of fish would clearly confer a tort right upon the owner of that fish, if the fish were in private waters. If, however, the fish were in public waters, the question would arise of whether commercial fishermen are entitled to recover. This question was answered in the affirmative in Union Oil Co. v. Oppen,¹⁸⁵ a Ninth Circuit opinion which professed to apply California law. The Oppen opinion's assumption that California courts would look favorably on tort recoveries for pure "economic loss" has subsequently been confirmed by the California Supreme Court's opinion in J'Aire Corp. v. Gregory,¹⁸⁶ recognizing a generic tort for the negligent infliction of emotional distress. One would need to know more about the negative consequences of "water pollution" and water supply "contamination" before assessing

the extent to which these negative consequences are compensable in a tort action.

HYPOTHETICAL J -- RELATED TO PRE-FABRICATED HOUSING

A company manufactures pre-fabricated housing. It distributes 90 percent of its product to areas of known seismic risk. The houses are constructed to applicable code standards and located on permanent foundations in an area of Bay fill. The developer hires a private contractor to construct standard pier foundations and to attach the home sections to each other and to the foundations. A moderate to large earthquake results in severe differential settling and violent shaking that causes the home sections to become detached from each other and from the foundations, making the homes uninhabitable. Is the manufacturer strictly liable?

There are three defendants here: the manufacturer, the developer, and the foundations private contractor. All three are possibly vulnerable to claims of negligence.

Given the manufacturer's knowledge of its seismic-risk market, it can be argued that the product it distributed for that market was negligently designed; here a full negligence analysis would be applicable. Also, if the manufacturer should have appreciated that its prefabricated houses would be particularly hazardous in a Bay-fill seismic-risk area, negligence law obliges it to warn the developer accordingly, and perhaps to give instructions as to necessary foundations. Compliance with Code standards merely counts as some evidence of non-negligence, especially since the Code almost certainly does not address the peculiar problem of Bay-fill seismic risk.

The developer has been possibly negligent in choosing an inappropriate product for locating in a high seismic-risk Bay-fill area. Also, having purchased that product, the developer is arguably negligent in failing to make special arrangements for very secure foundations. Here, too, a full negligence analysis is required.

The private contractor is arguably negligent for employing "standard" foundations in circumstances where the combination of Bay-fill and high seismic risk required "above standard" protection. Once again, a general negligence analysis would be pertinent. If, however, the contractor was merely complying with the specifications provided by the developer, primary liability would presumably remain with the developer.

Is there any room for "strict" liability, given the facts of Hypothetical J? A rule of strict liability applies to the sale of defective products. Is prefabricated housing a "product" for purposes of the strict products liability doctrine? A line of cases holds that individual buildings do not count as "products" for purposes of the strict liability doctrine.¹⁸⁷ However, another line of cases--including

one Court of Appeal opinion from California--has imposed the strict liability doctrine on large-scale developers who mass produce large numbers of standardized houses.¹⁸⁸ Only one case has dealt with the particular question of prefabricated housing. This is Kaneko v. Hilo Coast Processing,¹⁸⁹ a 1982 opinion from the Hawaii Supreme Court. The Kaneko holding is that prefabricated housing is indeed a product subject to the strict liability rule. In reaching this conclusion, Kaneko relied on the fact that prefabricated housing involves an "assembly-type situation;" that imposing strict liability for defective prefabricated houses would provide housing manufacturers with important safety incentives; and that these manufacturers are in a good position "to distribute the risk of injury for . . . defective chattal as a cost of doing business." One feels confident in predicting that the California Supreme Court would follow the Kaneko lead. Moreover, if a prefabricated house is indeed a "product," then the retailer as well as the manufacturer is vulnerable to a strict liability charge. See Vandermark v. Ford Motor Co.,¹⁹⁰ in which the California Supreme Court explicitly extended strict liability to product retailers. In Hypothetical J, the developer is the relevant "retailer".

Even if strict liability applies, however, this particular strict liability rule requires the identification and proof of some "defect" in the individual product. And the concept of defect in many ways resembles the concept of negligence. Defects are of three sorts: manufacturing defects involving some "flaw" in the individual product, design defects, and failures to warn. There is no indication of any manufacturing defect in the facts of Hypothetical J. Under the California Supreme Court's opinion in Barker v. Lull Engineering Co.,¹⁹¹ a product is defective in design only if the risks in that design exceed the benefits, or if the product fails to conform to "ordinary consumer expectations." The Barker risk-benefit test for design defect is obviously an outgrowth of the basic negligence formula developed by Judge Learned Hand. Barker adds two wrinkles, however. One is that once the plaintiff proves some "risk" in the product's design, the burden of establishing that the design is indeed risk-beneficial shifts to the defendant. Secondly, Barker indicates that the risk-benefit test should be applied from the perspective of "hindsight," taking advantage, apparently, of information that may not have been available at the time of the product's original sale. These two wrinkles that are unique to the design defect claim may moderately improve the plaintiff's chance of proving a tort violation. It is very unclear what kind of evidence is relevant to establishing that the product's design fails to comply with "consumer expectations." The California Supreme Court's recent decision in Campbell v. General Motors Corp.¹⁹² suggests that the jury should decide this issue on the basis of its own intuitions; Campbell explicitly holds that expert testimony is not required in presenting a consumer expectations claim. The strict liability theory of failure to warn largely incorporates the manufacturer's negligence obligation to warn (as discussed above), with the caveat that under Barker a "hindsight" approach may be appropriate in considering what instructions the manufacturer should have conveyed. On the facts of Hypothetical J,

it is unclear whether there is any new information that would render significant the "hindsight" issue.

As noted, under strict liability the retailer is liable for any defects in the product when sold by the retailer. The defect (if any) in the prefabricated home in Hypothetical J may well relate to its location and/or foundations. Because that location and those foundations were "fixed" by the time the developer sold the product to the private household, the developer would be liable for defects that may be associated with location or installation.

At this point, return to the strict liability of manufacturers, which generally applies to products in a defective condition when sold by the manufacturer. In Hypothetical J, if the "defect" relates to location or foundations, then the product acquired its defect only subsequent to the product's sale by the manufacturer to the developer. Under these circumstances, can the manufacturer be held liable for the defect in question? The answer to this question is apparently affirmative. In a leading opinion, the California Supreme Court has held in essence that the manufacturer of a completed product cannot delegate to anyone its duty to have its product delivered to the ultimate user free from defects.¹⁹³ Therefore, if the defect is introduced into the product by the locational choice of the retailer, the manufacturer can possibly be held liable on a strict liability basis. The same result would apply if the defect is associated with the foundations constructed by the private contractor employed by the developer prior to sale to the consumer.

The issue of causation of course remains to be mentioned. But for the negligence (or the defect), would these detachments have occurred?

A final question concerns the form of harm which the plaintiffs have suffered. As described in Hypothetical J, the harm is largely "economic"--the uninhabitability of an expensive prefabricated house. In Seely v. White Motor Co.,¹⁹⁴ Chief Justice Traynor opined that the strict liability theory does not apply to the problem of economic harm. (This Seely dictum has met with a mixed reception in other jurisdictions).¹⁹⁵ However, the "economic losses" to which Seely evidently refers, entails the profits the product owner loses if the product does not function properly. Indeed, the Seely opinion suggests that if the product itself suffers physical damage on account of its defect, the "economic loss" exception to strict liability would not apply. Under Hypothetical J, the prefabricated housing has indeed been physically damaged. Moreover, certain courts which have accepted Seely have also ruled that the economic loss exception does not apply when the product is damaged during an incident that "posed a serious risk of harm to people."¹⁹⁶ This qualification to the Seely exception might well be pertinent here, since the "violent shaking" could well have been productive of personal injuries.

The discussion in Seely is primarily concerned with the strict liability doctrine. In buttressing his support of an economic loss

exception, however, Chief Justice Traynor also indicated that even the negligent manufacturer is immune from liability if the plaintiff merely suffers economic loss. If this dictum-within-dictum still holds, then a plaintiff cannot circumvent the Seely rule by asserting negligence rather than strict liability. In its later opinion in J'Aire Corp. v. Gregory,¹⁹⁷ however, the California Supreme Court has established a general tort for the negligent infliction of economic harm. A plaintiff can recover so long as "the risk of harm is foreseeable and is closely connected with the defendant's conduct, . . . damages are not wholly speculative and the injury is not part of the plaintiff's ordinary business risk." It can be strongly argued that this explicit (if general) holding in J'Aire now takes precedence over the rather casual language (limited to manufacturers) in the earlier Seely. After J'Aire, therefore, the consumer probably is entitled to sue any entity within the chain of distribution whose negligence has been responsible for the uninhabitability of the prefabricated-home product.

HYPOTHETICAL K -- RELATED TO ELECTRICAL TRANSMISSION LINES

An electrical power company transmission line falls during an earthquake. The earthquake also causes the shut-off unit in the substation to fail, and the line remains live. Injuries, death, and fire result from subsequent contact with the line.

As noted above, in California the supply of electric power does not count as an "ultrahazardous" activity and hence is not subject to a strict-liability rule. Nevertheless, in an early opinion the California Supreme Court, noting that electricity is "a dangerous force, and one not generally understood," imposed on electric power companies an obligation "to use very great care to prevent injury to person or property." See Giraudi v. Electric Improvement Co.¹⁹⁸ While later California opinions have sometimes been content to describe the obligation of an electric utility in terms of "reasonable care" (Fairbairn v. American River Electric Co.),¹⁹⁹ one feels confident that in an appropriate case the Supreme Court would return to Giraudi's "very great care" formulation.²⁰⁰ One needs to know all the circumstances concerning the fall of the transmission line in order to determine whether the malfunction of the shut-off unit is the result of any departure on the power company's part from its "very great care" obligations.

Whether or not that malfunction is itself a product of power company negligence, the power company is probably under an "affirmative duty" to engage in reasonable measures to alleviate the dangerous situation once it arises. This is due to the doctrine, discussed in II-F above, whereby if a party creates a situation of peril (even non-negligently) the party is then under an obligation to remedy the situation.

"Reasonableness" remains, however, the criterion for testing a defendant's compliance with an affirmative obligation. In Hypothetical K, plaintiffs would need to show that the power company

failed to make reasonable efforts to reduce the danger created by the live lines. An ambitious plaintiff's lawyer, however, could undoubtedly conceive of a dozen theories of "unreasonableness" that would entitle him to at least take the case to the jury. Indeed, it is quite possible that a court would permit a jury to find that a power company is negligent if it fails to engage in advance planning to cover the kind of contingency described in Hypothetical K.

Once negligence has been pinned down, the court can inquire into causation. Would non-negligent precautions have prevented the fall of the wire or the failure of the shut-off valve? Would a non-negligence discharge of the "affirmative duty" have prevented injuries in question? These are in some sense questions of fact, subject to the legal refinements mentioned in II-B.

Of course, in Hypothetical K some victims may be partly responsible for their own injuries by virtue of their own careless conduct in approaching the live line. If so, under Li v. Yellow Cab Co. their contributory negligence reduces, but does not defeat, their recovery as against a negligent defendant. Li virtually abrogates the separate and complete defense of assumption of risk.

Footnotes

1. Restatement (Second) of Torts § 281 (1965)
2. California Jury Instructions: Civil 54 (6th ed. 1977)
3. 15 Cal. 3d 40, 47, 539 P.2d 36, 40, 123 Cal. Rptr. 468, 472 (1975)
4. 47 Cal. 2d 457, 303 P. 2d 1041 (1956)
5. Id. at 463-64, 303 P.2d at 1045
6. 3 Cal. 3d 756, 478 P.2d 465, 91 Cal. Rptr. 745 (1970)
7. Cobbs v. Grant, 8 Cal. 3d 229, 502 P.2d 1, 104 Cal. Rptr. 505 (1972)
8. 98 Ohio St. 42, 120 N.E. 300 (1918)
9. 53 Cal. App. 2d 498, 127 P.2d 1033 (1942)
10. Id. at 502-03, 127 P.2d at 1035, 1036
11. Note, Earthquake Danger: Need for a Viable Cause of Action, 1972 Law & Social Order 450, 452
12. 18 Cal. App. 2d 90, 62 P.2d 1380 (1936)
13. Id. at 94, 62 P.2d at 1382
14. 29 S.C. 96, 6 S.E. 936 (1888)
15. Id. at 101, 6 S.E. at 937
16. 59 Cal. 197 (1881)
17. Id. at 202
18. Id. at 205
19. Id. at 201-02
20. Id. at 204
21. 4 Cal. App. 3d 364, 370, 84 Cal. Rptr. 507, 511 (1970)
22. 215 Cal. App. 2d 26, 28-29, 29 Cal. Rptr. 871, 873 (1963)
23. 74 Wash. 2d 884, 885, 447 P.2d 704, 704 (1968)
24. Id. at 885, 447 P.2d at 704
25. 11 Exch. 781 (1856)

26. 144 U.S. 408 (1892)
27. Id. at 427
28. Restatement (Second) of Torts § 288 (1965)
29. Id. at Comment a
30. 22 Cal. 2d 111, 137 P.2d 441 (1943)
31. Id. at 126, 127 P.2d at 449
32. 1 Cal. 3d 253, 460 P.2d 965, 81 Cal. Rptr. 765 (1969)
33. 111 Cal. App. 2d 626, 245 P.2d 583 (1952)
34. 129 Cal. App. 2d 67, 276 P.2d 703 (1954)
35. 1 Cal. 3d at 258, 460 P.2d at 968, 46 Cal. Rptr. at 768
36. 129 Cal. App. 2d at 72, 276 P.2d at 707
37. 219 Pa. Super. 479, 281 A.2d 707 (1971)
38. 597 F.2d 1018 (5th Cir. 1979)
39. 601 F.2d 133, 138 (4th Cir. 1979)
40. Morris, The Role of Criminal Statutes in Negligence Actions, 49 Colum. L. Rev. 21, 46 (1949)
41. 282 Or. 61, 63, 577 P.2d 1322, 1324, rehearing denied, 579 P.2d 1287 (1978)
42. Id. at 64, 65, 577 P.2d at 1325
43. Id. at 83-84, 577 P.2d at 1334-35
44. See the elaborate presentation of rules in Restatement (Second) of Torts §§ 328E-387 (1965)
45. See id. at § 332
46. 69 Cal. 2d 108, 443 P.2d 561, 70 Cal. Rptr. 97 (1968)
47. California Jury Instructions: Civil § 8.00 (1983 rev.)
48. Evans v. Thomason, 72 Cal. App. 3d 978, 984-85, 140 Cal. Rptr. 525 529 (1977)
49. Carlson v. Ross, 271 Cal. App. 2d 29, 76 Cal. Rptr. 209 (1969); Fitch v. LeBeau, 1 Cal. App. 3d 320, 81 Cal. Rptr. 722 (1969)
50. 7 Cal. 3d 170, 496 P.2d 1276, 101 Cal. Rptr. 908 (1972)

51. 4 Cal. App. 3d 129, 84 Cal. Rptr. 449 (1970)
52. Id. at 137, 84 Cal. Rptr. at 445
53. For a similar, quite recent assessment, see *Jarvis v. Southern Pacific Transp. Co.*, 142 Cal. App. 3d 246, 191 Cal. Rptr. 29 (1983)
54. Hawkins, *Premises Liability After the Repudiation of the Status Categories: Allocation of Judge and Jury Functions*, 1981 Utah L. Rev. 15
55. Id. at 16-17
56. Id. at 22
57. Restatement (Second) of Torts § 323 (1965)
58. Id. at § 314A
59. Id. at § 321(1). See also id. at § 322
60. Id. at § 321(2)
61. 86 Cal. App. 3d 656, 150 Cal. Rptr. 384 (1978)
62. *Tarasoff v. Regents of University of California*, 17 Cal. 3d 425, 435 n.5, 551 P.2d 334, 343 n.5, 131 Cal. Rptr. 14, 23 n.5 (1975)
63. *Soldano v. O'Daniels*, 141 Cal. App. 3d 443, 190 Cal. Rptr. 310 (1983)
64. 60 Cal. 2d 92, 383 P.2d 441, 32 Cal. Rptr. 33 (1963)
65. 33 Cal. Rptr. 175 (1963), affirmed, 61 Cal. 2d 256, 391 P.2d 168, 37 Cal. Rptr. 896 (1964)
66. 258 Cal. App. 2d 711, 65 Cal. Rptr. 788 (1968)
67. 20 Cal. 3d 512, 573 P.2d 465, 143 Cal. Rptr. 247 (1978)
68. Id. at 519, 573 P.2d at 469, 143 Cal. Rptr. at 251
69. *Fairchild v. California Stage Co.*, 13 Cal. 599, 601 (1859)
70. See *Vascoe v. Ford*, 212 Miss., 370, 54 So. 2d 541 (1951)
71. See *Huggans v. Southern Pacific Co.*, 92 Cal. App. 2d 599, 207 P.2d 864 (1949)
72. See W. Prosser, *Law of Torts* 330-31 (4th ed. 1971)
73. See id. at 331-33
74. 68 Cal. 2d 728, 441 P.2d 912, 69 Cal. Rptr. 72 (1968)

75. 24 N.Y. 2d 609, 249 N.E.2d 419, 301 N.Y.S.2d 554 (1969)
76. 59 Cal. 2d 295, 299, 379 P.2d 513, 515, 29 Cal. Rptr. 33, 35 (1963)
77. 247 Cal. App. 2d 793, 56 Cal. Rptr. 115 (1967)
78. 48 Cal. App. 3d 376, 121 Cal. Rptr. 768 (1975)
79. 19 Cal. 3d 59, 77, 562 P.2d 1022, 1031, 137 Cal. Rptr. 863, 872 (1977)
80. 27 Cal. 3d 916, 616 P.2d 813, 167 Cal. Rptr. 831 (1980)
81. Calif. Labor Code § 3600
82. See *Maier v. Workers' Comp. App. Bd.*, 33 Cal. 3d 729, 734 n.3, 190 Cal. Rptr. 904, 906 n.3 (1983)
83. 202 Cal. 239, 259 P. 1096 (1927)
84. *Id.* at 245, 259 P. at 1099
85. 202 Cal. 247, 259 P. 1099 (1927)
86. *Id.* at 251, 259 P. at 1100
87. 18 Cal. Comp. Cases 240 (1953)
88. 7 Cal. Comp. Cases 34 (1941)
89. 1 Cal. Comp. Cases 39 (1936)
90. 19 I.A.C. 64 (1933)
91. 41 Cal. 2d 476, 263 P.2d 4 (1953)
92. *Id.* at 678, 263 P.2d at 5
93. *Id.* at 680, 263 P.2d at 6
94. 202 Cal. at 241-42, 259 P. at 1097
95. 1 A. Larson, *The Law on Workmen's Compensation* § 10.00 (1982)
96. 95 Cal. App. 2d 443, 214 P.2d 41 (1950)
97. 11 Cal. 3d 274, 520 P.2d 978, 113 Cal. Rptr. 162 (1974)
98. 9 Cal. 3d 848, 512 P.2d 843, 109 Cal. Rptr. 211 (1973)
99. 154 Tex. 430, 279 S.W.2d 315 (1955)
100. 18 Cal. App. 3d 852, 861, 96 Cal. Rptr. 279, 286 (1971)

101. 131 Cal. App. 3d 308, 182 Cal. Rptr. 304 (1982)
102. 131 Cal. App. 3d 803, 182 Cal. Rptr. 839 (1982)
103. 33 N.Y. 2d 117, 350 N.Y.S.2d 617, 305 N.E.2d 750 (1973)
104. 109 Cal. 86, 41 P. 783 (1895)
105. 109 Cal. 96, 41 P. 786 (1895)
106. 39 Cal. 2d 781, 249 P.2d 8 (1952)
107. 30 Cal. 3d 268, 637 P.2d 266, 179 Cal. Rptr. 30 (1981)
108. 30 Cal. 3d at 287, 637 P.2d at 278, 179 Cal. Rptr. at 42
109. Calif. Labor Code § 3602(a) (1983 Supp.)
110. 119 Cal. Rptr. 3d 757, 174 Cal. Rptr. 348 (1981)
111. Id. at 813, 174 Cal. Rptr. at 384
112. Id. at 818, 174 Cal. Rptr. at 387
113. Calif. Labor Code § 4553 (1983 Supp.)
114. 40 Cal. 2d 656, 255 P.2d 431 (1953)
115. 54 Cal. 418 (1880)
116. 22 Cal. 2d 72, 136 P.2d 777 (1943)
117. Id. at 75-76, 136 P.2d at 778
118. 297 F.2d 411 (5th Cir. 1961)
119. 677 F.2d 985 (3d Cir. 1982)
120. 691 F.2d 646 (3d Cir. 1982)
121. Id. at 651.
122. 125 Cal. 627, 38 P. 200 (1899)
123. 60 F.2d 737 (2d Cir. 1932)
124. See W. Prosser, *supra* note 77, at 168
125. See *Pauly v. King*, 44 Cal. 2d 649, 655, 284 P.2d 487, 490 (1955);
Gonzales v. Robert Hiller Constr. Co., 179 Cal. App. 2d 522, 534, 3
Cal. Rptr. 832, 839 (1960)
126. 219 Cal. App. 2d 351, 33 Cal. Rptr. 133 (1963)

127. 119 Cal. App. 2d 393, 259 P.2d 934 (1953)
128. See *Sinz v. Owens*, 33 Cal. 2d 749, 756, 205 P.2d 3 (1949)
129. See e.g., *Hammond v. International Harvester Co.*, 691 F.2d 646 (3d Cir. 1982)
130. See In re Related Asbestos Cases, 543 F. Supp. 1142, 1151-52 (N.D. Cal. 1982)
131. 26 Cal. 2d 847, 851-52, 161 P.2d 556, 558 (1945), quoting 41 C.J.S. 349 (1944)
132. Restatement (Second) of Contracts § 261 (1981)
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157. See *Werkman v. Howard Zink Corp.*, 97 Cal. App. 2d 418, 218 P.2d 43 (1978)
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180. 59 Cal. App. 555, 211 P. 43 (1922)
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182. 182 Cal. 34, 186 P. 766 (1920)
183. Id. at 37, 186 P. at 767
184. The current citation is Restatement (Second) of Torts § 522(C) (1977)
185. 501 F.2d 558 (9th Cir. 1974)
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188. See *Schipper v. Levitt & Sons, Inc.*, 44 N.J. 70, 207 A.2d 314 (1965); *Kriegler v. Eichler Homes, Inc.*, 269 Cal. App. 2d 224, 74 Cal. Rptr. 749 (1969)
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196. E.g., Pennsylvania Glass Sand Corp. v. Caterpillar Tractor Co., 652 F.2d 1165, 1174 (3d Cir. 1981)
197. 24 Cal. 3d 799, 598 P.2d 60, 157 Cal. Rptr. 407 (1979)
198. 107 Cal. 120, 124, 40 P. 108, 109 (1895)
199. 170 Cal. 115, 118, 148 P. 788, 789 (1915)
200. Indeed, there is "high degree of care" language in Fairbairn itself. Id. at 117, 148 P. at 789 (1915)

BACKGROUND RESEARCH REPORT 4

THE IMPACT OF TORT LIABILITY ON THE WILLINGNESS OF COMPANIES TO MITIGATE EARTHQUAKE HAZARDS--

Results of Surveys and Interviews Conducted as Part of a Project
on Private Sector Liability for Earthquake Hazards and Losses

June 1983

Association of Bay Area Governments

CREDITS

Staff:

Jeanne Perkins, Earthquake Preparedness Program Manager and
Project Principal Investigator; ABAG

Douglas Detling, Legislative Affairs Officer; ABAG
Richard Eggerth, ABAG Associate Legal Counsel; Benner, Harris and Moy
Claudia Jane Maupin, Research Director; Solem and Associates
Kenneth Moy, ABAG Legal Counsel; Benner, Harris and Moy

Marcia Loss, Administrative Officer; ABAG
Josie Spurlock, Research Assistant; Solem and Associates

Project Review Committee:

Rod Diridon (Chairman) - Santa Clara County Supervisor
Stanley Scott (Vice-Chairman) - California State Seismic Safety Commission

Robert D. Brown - Geologist, U.S. Geological Survey
Henry J. Degenkolb - H. J. Degenkolb Associates, Engineers
Peter B. Hawes - Design Professionals Insurance Corporation
John H. Larson - Los Angeles County Counsel
Bruce D. Oliver - Kaiser Aluminum and Chemical Corporation
H. Roger Pulley - California Office of Emergency Services
Arvo Van Alstyne - State of Utah Commissioner of Education
Charles T. Van Deusen - Pacific Gas and Electric Company

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INTRODUCTION

One objective of the project on "Private Sector Liability for Earthquake Hazards and Losses" was to determine whether private businesses and industries are responding to liability as a stimulus to earthquake hazard reduction. To ensure adequate data to identify the perceptions and activities of the private sector, two opinion gathering techniques were used. Three surveys -- one for key company officials, one for company legal counsels and one for design professionals -- were developed, mailed, and analyzed with the extensive help of Solem and Associates. In addition, in-person interviews were conducted with company officials and local government staff at four sites of recent earthquakes, as well as at a site without a recent earthquake for control purposes. The mail survey and interview samples were supplemented with additional interviews of company officials in selected business sectors. The responses to the questionnaires and interviews have provided data to determine:

- the effectiveness of liability as a stimulus for earthquake hazard mitigation by the private sector;
- the extent to which liability, or perceived liability, is inhibiting earthquake hazard mitigation by that sector; and
- if the effectiveness of liability as a safety incentive can be increased.

MAJOR CONCLUSIONS

The questionnaires and interviews addressed four major areas of concern:

- the level of awareness of earthquake hazards and the extent of preparedness for earthquakes;
- the current knowledge of, and concern for, tort liability for earthquake hazards;
- the extent of liability insurance and risk management; and
- attitudes toward tort liability, its impact on earthquake hazards, and its potential use in more effectively promoting earthquake hazard reduction.

AWARENESS OF EARTHQUAKES AND PREPAREDNESS

Company officials surveyed described the level of awareness of earthquake hazards in their industry or profession as moderate, while those interviewed described the awareness of earthquake hazards in their business community as high, however. The design professionals surveyed also characterized the level of awareness as high. The company officials surveyed described seismic safety as a moderate priority within their company, while the design professionals ranked it as a high priority.

The company officials surveyed believed that an earthquake probably would occur and cause moderate to severe property damage within their area, while the design professionals were more convinced that such an earthquake would occur. Consistent with these responses, more than half of the design professionals, while less than one-fifth of the company officials surveyed, noted that they knew of a proposed project that had been internally disapproved or significantly changed due to earthquake safety considerations within their company in the

past 10 years. However, both the company officials surveyed and interviewed, as well as the design professionals, described their own company's state of preparedness for an earthquake as between reasonably prepared and not very well prepared. Officials of the larger companies interviewed were more likely to believe that their own company was very well or reasonably well prepared. Surprisingly, almost half of the company officials surveyed noted that their company had a disaster response plan which takes earthquakes into account, while less than a third of the design professionals worked for a company with such a plan.

Over half of the company officials interviewed at sites of recent earthquakes believed that the recent earthquake in their area had not changed their company's awareness of earthquakes or preparedness for such events. Many of those noting changes believed that earlier earthquakes had more of an effect. The remainder citing changes were likely to have had their building or facility damaged and believed that because they had fixed the defects (in a manner often better than required by law), their company was now better prepared.

Those company officials interviewed expressed a pride in their safety programs. The extent of these programs tended to be broader and more complete than imagined by local agencies. The program emphasis tends to vary by type of business or industry. Earthquake safety programs of manufacturers and of electronics and other high technology industries emphasize worker safety, evacuation, emergency medical capabilities and fire control. Types of safety programs of business offices emphasize third party safety, insurance, and redundancy of record keeping. Larger companies who could afford to have at least one person whose primary responsibility was safety or disaster preparedness tended to have more complete and more formal programs. Retail service businesses also tended to have more comprehensive programs because of their concern with both worker safety and third parties (customers or visitors). The companies with the most complete programs were usually the most highly regulated, and included hospitals, utilities, and companies handling large amounts of hazardous or nuclear materials.

The primary motivation for developing earthquake preparedness and general safety programs was never liability as perceived by the company officials interviewed. Liability was viewed as having a small to insignificant impact. Reasons for these programs (other than the obvious need to comply with regulations) included:

- worker safety (that is, not wanting to see their friends and associates injured or killed);
 - employee morale and union-management relations;
 - concern for public safety (visitors, customers and by-standers);
 - good business practice -- from the financial perspective of minimizing damage to the company's investment in buildings and equipment and from the need to continue in business or continue to provide a service and collect money;
 - the public relations aspects of acting, or not acting, responsibly;
 - publicity from the media on the need for earthquake preparedness;
 - aggressive programs of the company's insurance carrier or local fire department;
- and

- key company officials who are personally committed to earthquake or disaster preparedness and provide needed leadership.

LIABILITY KNOWLEDGE AND CONCERN

Over three-quarters of the design professionals had observed concern about potential liability for earthquake hazards within their company. Only two-fifths of the company officials surveyed had observed such concern. Most of these officials believed that this absence of concern was because liability had not occurred to the officials as an issue. In the interviews, many company officials noted that their concern was slight or non-existent because potential liability had been dealt with through the company's insurance, engineering design, or safety programs.

Both the company officials surveyed and interviewed, as well as the design professionals, believed that they understood the general issue of liability and perhaps had a good understanding of some specific areas. Many of the officials interviewed also characterized their understanding of liability as detailed and complete. This greater understanding is probably due to ABAG's efforts to contact the best people in each company to respond to the questions in person.

Close to three-quarters of both groups surveyed, as well as the company officials interviewed, felt that liability was so uncertain that it was difficult in many instances to predict the potential liability implications of their company's various activities. While almost three-quarters of the company officials surveyed believed that uncertainty about potential liability has little or no effect on company decisions, only half of the design professionals had such a belief. More than a quarter of those professionals felt that uncertainty about potential liability contributes to the solution of the problem through unwarranted concern on the part of the company. In the interviews, many company officials indicated that uncertainty caused them to use common sense, to try to act reasonably, and to purchase insurance.

Three-fifths of the company officials and design professionals surveyed believed that companies in California could be held liable for a negligent failure to reduce known earthquake hazards. Close to a third believed companies might or might not be held liable. Less than one-tenth felt that companies could not be held liable. The results of the interviews affirmed these conclusions. Company officials who were interviewed mentioned several situations where liability could exist, including a known hazard, a small earthquake, a large visible company, media publicity about mitigation, disregard for codes or regulations, and failure to be reasonable or use an appropriate standard of care.

Compared to those surveyed who did not note a concern for liability for earthquake hazards, those who did tended to believe that seismic safety was a higher priority in their company and that their emergency preparedness program was stronger. However, no consistent relationship could be found between perceived degree of liability for earthquake hazards or the uncertainty of general liability and a company's awareness of or response to earthquake hazards.

LIABILITY INSURANCE AND RISK MANAGEMENT

Two-fifths of the company officials surveyed worked for companies which were largely self-insuring for tort liabilities, while only 30% of the design professionals worked for such companies. Earthquake insurance for property damage was more common among companies

surveyed in general (30+%) than for those of the design professionals (less than 10%). Similarly, business disruption insurance or insurance for consequential economic loss was four times more common among companies surveyed in general than for those of the design professionals.

One-fourth of the design professionals noted that their company had a formal risk management program, while more than one-third of the company officials surveyed noted that their company had such a program. More than half of those working for companies with such a program believed that it had increased the awareness of their company's officials of liability as a factor in decision-making to a substantial degree.

Companies surveyed with self-insurance for tort liability, earthquake insurance and formal risk management programs tended to have more comprehensive earthquake preparedness programs than average. This relationship may be due to the higher occurrence of all three programs among large companies, rather than a cause-and-effect relationship existing between insurance coverage or risk management and exemplary earthquake preparedness.

ATTITUDES TOWARD TORT LIABILITY

More than half of the design professionals surveyed thought that a design professional should be held liable if his negligent failure to advise a client to initiate corrective or preventive measures causes or makes more likely the loss of life or property damage resulting from earthquake hazards. More than one-third felt that such liability should depend on the situation, while only 8% felt that they should not be held liable.

Approximately two-fifths of the company officials surveyed thought that a company should be held liable if its negligent failure to initiate corrective measures causes or makes more likely the loss of life or property damage resulting from earthquake hazards. About half felt that such liability should depend on the situation, while only 7% felt that companies should not be held liable. Those company officials interviewed gave similar responses.

In the interviews, officials indicated that they believed liability should exist because they would not want to work for an irresponsible company, liability was consistent with the moral obligations of companies, and liability was consistent with the legal concepts of "reasonableness" and a "standard of care." Situations where liability should exist would depend on the cost of mitigation, the size and foreseeability of the earthquake, and the standard of care established. Those who believed that liability should not exist believed that earthquakes were clearly "an act of God."

If, by statute, design professionals were explicitly declared liable for their failure, negligent or intentional, to advise a client to take actions to reduce hazards, three-fourths of those surveyed felt that they would do more to reduce hazards than they are doing now. Similarly, seven-eighths of the company officials surveyed believed that if companies were declared liable for their failure to take such actions, they would do more.

Design professionals, when asked which course of action would be most effective in reducing earthquake hazards, favored leaving some degree of liability and immunity for design professionals as currently exists, rather than making such professionals more liable or more immune. Similarly, three-fifths of these professionals were not personally in favor of increasing liability of design professionals. On the other hand, more than two-fifths of the company officials surveyed felt that making companies more liable than now would be an effective action to reduce earthquake hazards. Close to two-thirds even personally favored

increased liability for companies as a means of encouraging them to reduce risks from earthquake hazards, if only in some instances.

More than two-thirds of the design professionals were in favor of a state-mandated program requiring private sector improvement of dangerous facilities which allows a grace period of immunity before the owner becomes subject to potential liability. Only two-fifths of the company officials surveyed favored such a program, although one-third indicated that they might or might not favor it.

On the other hand, most company officials interviewed believed that companies should not be made more liable or more immune. They believed other courses of action would be more effective, including:

- educating company officials about their liability;
- educating company officials about how to better prepare for an earthquake, especially if such preparations cost little;
- instituting government regulations to mitigate unreasonable hazards, including retrofitting older tilt-up concrete buildings, unreinforced masonry buildings, and mobile home foundations; and fastening mechanical and electrical equipment, utilities and furnishings;
- using the carrot of safety, rather than using the stick of liability;
- using financial incentives to promote emergency preparedness;
- working with insurance companies and business and professional organizations;
- working for better cooperation and understanding between the business community and local or state government in disaster preparedness; and
- working with the news media to promote continued awareness of earthquake hazards.

SURVEY AND INTERVIEW METHOD

The conclusions drawn in this discussion are based on the results of a survey mailed to company officials and design professionals supplemented with information from in-person interviews of more company officials. The percentage and mean response data are based on those responding to each question unless otherwise noted.

THE SURVEYS

The surveys were developed by ABAG staff with advice from Solem and Associates. After comments were obtained from the project's Review Committee, three questionnaires -- one for company officials, one for company legal counsels and one for design professionals -- were used.

Solem and Associates provided the survey samples. The design professionals' sample was drawn from the following professional associates:

- the American Institute of Architects, California Council;
- the American Society of Civil Engineers, San Francisco Section;
- the Association of Engineering Geologists;
- the Consulting Engineers Association of California;
- the Earthquake Engineering Research Institute;
- the Soil and Foundation Engineers Association;
- the Structural Engineers Association of Northern California; and
- the Structural Engineers Association of Southern California.

An effort was made to involve design professionals from urban and rural areas and from all areas of California.

The company officials' sample was drawn from a number of reference sources and included companies in the following categories: real estate, warehousing, development, utilities, hospitals, transportation and transportation services, electronics, chemicals, contracting, pre-fab housing, insurance, banking, material suppliers, general service and general retail. Individuals selected from the various companies held the title or general job description of manager, property manager, risk manager, loan officer, operations manager or legal counsel. The legal counsel sample was developed by contacting the law firms associated with each company who did not have in-house counsel to determine their attorney representative. Again, efforts were made to involve individuals from urban and rural areas, from all parts of California, and from companies of all sizes.

In early February 1983, an introductory letter describing the overall project on private-sector liability for earthquake hazards and losses and the nature of the surveys to be conducted was sent to all individuals on the sample lists. As a result of returned mail and forwarded mail, the sample was refined. In early March 1983, the questionnaires themselves were mailed. Beginning at the end of March, Solem and Associates staff made two, and in

some cases three, rounds of calls to remind those who had not yet returned the completed questionnaire. Responses and rates are shown on Table 1 which follows.

TABLE 1: SURVEY RESPONSES AND RESPONSE RATES

Category	Sent Out	Returned	Response Rate
Design Professionals	451	176	39.0 percent
Company Officials	729	88	12.1 percent
Legal Counsels	119	3	2.5 percent
OVERALL	1,299	267	20.6 percent

The sampling error which applies to the design professionals survey is ± 5 percent to ± 9 percent at the 95 percent confidence level; i.e., the chances are 95 in 100 that a given response is within ± 5 to ± 9 percent of the true percentage for all design professionals in California. The sampling error for the company officials is ± 7 percent to ± 12 percent at the 95 percent confidence level. The response rate for the legal counsels is so low that the survey results cannot be discussed outside of the remainder of the company officials and a sampling error therefore is not provided.

One of the three attorneys who returned the questionnaire was subsequently contacted. He indicated that potential reasons for the low response may include:

- the time required to fill out the survey;
- the distaste for surveys common among attorneys;
- the difficulty in answering many of the questions; and
- the reluctance to contribute to a project when its purpose is not fully understood.

In addition, none of the attorneys not actually on the staff of the company returned the questionnaire. If the sample size included only in-house counsel, of which there were 41, a response rate of 7.3% was achieved, much closer to that of the other company officials.

THE INTERVIEWS

The Review Committee for the project selected four sites of recent earthquakes to be visited. Criteria for choosing these sites included:

- they must be located in California;
- the earthquake must have caused property damage;

- the earthquake must have caused injury;
- more recent earthquakes were preferred (since job turnover may have caused key officials to be unable to be located); and
- relatively developed or urban areas were preferred due to the likelihood that a variety of businesses and industries would have been affected.

The actual sites selected were:

- the Santa Barbara area;
- the San Fernando Valley area;
- the El Centro/Imperial County area; and
- the Livermore Valley area.

Data on the earthquakes occurring in these locations are included in Table 2. In addition, some information related to business in the Mammoth Lakes and Coalinga areas was collected because some retail service and financial institutions contacted had branches in these locations.

TABLE 2: EARTHQUAKES AT SITES VISITED*

Date	Location	Magnitude	Lives Lost	Injuries	Estimated Property Losses (in million \$)
Feb. 9, 1971	San Fernando	6.4	65	2,543	505.0
Aug. 13, 1978	Santa Barbara	5.7	0	65	7.3
Oct. 15, 1979	Imperial Valley	6.6	0	100	30.0
Apr. 26, 1981	Westmorland (Imperial Co.)	5.6	0	0	1.08
Jan. 24, 1980	Livermore	5.5	1?	44	3.54**
Jan. 27, 1980	Livermore	5.8	0	0	

*Data on the first earthquake are from Robert A. Olson and Stanley Scott. "Preparing for Earthquakes: Where Does California Stand?" California Data Brief, Institute of Governmental Studies, University of California: Berkeley, California, Vol. 4, No. 3, October 1980. Data for earthquakes since 1975 are from Peter A. Stromberg, State of California Seismic Safety Commission. Personal communication, February 7, 1983.

**No one -- except the Department of Energy and the Lawrence Livermore Laboratory -- knows the extent of damage at the Laboratory. This estimate assumes \$2.0 million, which is probably low.

In addition, a site that had not experienced significant damage from recent earthquakes but that is susceptible to damage from some future earthquake was visited to determine, for scientific control, if companies in these areas regard earthquake hazards and potential liability differently. The Committee selected Redwood City as an appropriate site or jurisdiction.

Finally, several supplemental interviews with companies headquartered in the San Francisco Bay Area were conducted for a number of reasons.

1. The branches of financial and service institutions often referred ABAG staff to the headquarters office.
2. The headquarters of utilities and other infrastructure services were rarely available in the areas visited.
3. The number of company officials and attorneys who responded to the mail surveys was believed too low for acceptable use in the analysis.

The names of companies to be contacted were obtained from the local Chambers of Commerce and the list of the 500 largest companies headquartered in California published by California Business. Of the companies contacted, approximately two-thirds eventually participated between mid-March and the end of May 1983. Reasons for not participating included:

- o appropriate officials not being available in the time needed;
- o officials believing that the headquarters office would be a more appropriate contact point;
- o the company having been formed after the earthquake of interest; and
- o a genuine reluctance of officials to participate.

However, since the initial reluctance of some companies to participate without substantial cajoling appeared to have no relationship to the sophistication of their disaster programs or on their attitudes toward tort liability, the approach used should not have distorted the responses significantly.

The types of officials interviewed, as well as the questions asked, were similar to those of the questionnaires. However, questions on the impact of a recent earthquake on preparedness or perceptions of liability were asked as appropriate. In addition, the interview format provided an opportunity to gather information on the reasons for various responses.

Finally, at the four earthquake sites, as well as at the control site, at least one local government agency was contacted to obtain the local officials' perceptions of the community and private sector response to earthquake preparedness and tort liability.

The number of offices participating and officials interviewed at each location follow in Table 3.

TABLE 3: NUMBER OF OFFICES AND OFFICIALS INTERVIEWED

<u>Location</u>	<u>Local Government</u>		<u>Businesses & Industries</u>	
	<u>No. Offices</u>	<u>No. People</u>	<u>No. Offices</u>	<u>No. People</u>
Santa Barbara	1	4	6	13
San Fernando Valley	1	5	6	22
El Centro/Imperial Co.	2	8	5	6
Livermore Valley	1	4	6	12
Redwood City	1	7	4	7
Supplemental	-	-	12	47
<hr/>				
TOTALS	6	28	39	107

In eighteen of the offices visited, at least one representative from the legal department was present.

CHARACTERISTICS OF PARTICIPANTS

The officials who participated in the surveys and interviews work for a variety of types of businesses and industries in California (see Table 4).

TABLE 4: PARTICIPANTS BY COMPANY CATEGORY

Company Category	No. of Officials Responding to the Surveys	No. of Companies Interviewed
Retail	6	4
Financial Services	2	5
Hospital Services	8	2
Contracting, Development, Real Estate & Property Management	24	4
Engineering Services	8	-
Legal Services	-	1
General Services	13	2
Utility, Communication and Transportation Services	10	4
Mining, Construction Material and Chemical Industries	7	5
Manufacturing Industries	2	5
Agricultural Industries	-	2
High Technology Industries	8	5
TOTAL	88	39

The companies had from fewer than ten to tens of thousands of employees. In the case of the large companies, the headquarters office was usually contacted, although branches also were interviewed. The companies included subsidiaries and corporate headquarters.

Those officials who responded to the surveys tended to be established members of their company and profession. The design professionals also tended to have significant experience (see Tables 5 and 6).

TABLE 5: NUMBER OF YEARS SURVEY PARTICIPANTS
HAD BEEN WITH THEIR CURRENT COMPANY

Years with Company	Percent of Design Professionals Participating	Percent of Company Officials Participating
Less than 1 year	3%	6%
1 to 2 years	6	5
2 to 5 years	19	18
5 to 10 years	17	22
More than 10 years	55	49

TABLE 6: NUMBER OF YEARS SURVEY PARTICIPANTS
HAD WORKED IN THEIR INDUSTRY

Years with Industry	Percent of Design Professionals Participating	Percent of Company Officials Participating
Less than 1 year	0%	2%
1 to 2 years	1	3
2 to 5 years	8	6
5 to 10 years	10	16
10 to 20 years	23	18
More than 20 years	58	54

One-third of the company officials and 43% of the design professionals who returned the surveys agreed to be contacted for subsequent in-person interviews which may be needed to discuss potential project recommendations.

AWARENESS OF EARTHQUAKES AND PREPAREDNESS

EARTHQUAKE HAZARD SEVERITY

To obtain a perspective on how those company officials and design professionals surveyed view the seriousness of earthquake hazards in the context of their business, they were asked a series of four questions.

First, those surveyed were asked how they would describe the level of awareness of earthquake hazards in their industry or profession given a scale of:

- 1 = very high;
- 2 = moderately high;
- 3 = low;
- 4 = very low; and
- 5 = no awareness at all.

The mean response of the company officials surveyed was 2.3 (i.e., between moderately high and low awareness). Officials of companies providing engineering services rated awareness as higher than other company officials (mean response = 1.8). Not surprisingly, the design professionals rated the level of awareness as higher, with a mean response of 1.5 (i.e., between very high and moderately high with 58% describing it as very high).

Next, these officials and professionals surveyed were asked how they would rate seismic safety as a policy issue within their company on a scale of:

- 1 = extremely high priority;
- 2 = moderately high priority;
- 3 = moderately low priority; and
- 4 = extremely low priority.

The mean response of the company officials was 2.5 (i.e., between a moderately high priority and a moderately low priority). Again, the design professionals rated the level as greater, with a mean response of 1.8. In addition, officials of companies providing engineering services also rated earthquakes as a higher priority than other company officials (mean response = 1.9).

Third, those surveyed were asked to rate the likelihood of an earthquake occurring and causing moderate to severe property damage within the geographic area in which their office or facility is located within the next fifty years given a scale of:

- 1 = definitely will occur;
- 2 = probably will occur;

- 3 = probably will not occur; and
- 4 = definitely will not occur.

No one reported that such an earthquake will definitely not occur. The company officials felt that the earthquake probably will occur (m.r. = 2.0), while the design professionals believed the earthquake is even more likely (m.r. = 1.7). Officials of companies providing engineering services rated earthquakes as the most likely (m.r. = 1.5).

Last, those surveyed were provided with a list of earthquake hazards. The company officials were asked to rate each on how great a problem the hazards were for the typical facility their company owns or occupies in their area. The design professionals were asked to rate each on how great a problem the hazards were for the typical facility designed by their company in their area. The scale used was:

- extremely serious problem here;
- somewhat serious problem here;
- not a serious problem here; and
- not at all a problem here.

The results are shown in Table 7.

Overall, the design professionals tended to rate all of the hazards as more serious than the company officials. It is particularly interesting to note that the old brick/masonry buildings, one of the least serious hazards as rated by the company officials for their facilities, was given the second most serious mean hazard rating by the design professionals in their work. Two other hazards, weak soil under building foundations and earthquake-triggered landslides, were rated much more serious by the design professionals in their work than by the company officials for their facilities. When asked to choose the one item they believed presented the greatest problem, the company officials noted problems for their own facilities with:

- proximity to fault (22%);
- curtailment of water supply and resultant fire hazard (18%);
- disruption of power (14%); and
- containment of hazardous materials (8%).

The design professionals, when asked a similar question for facilities in their work, noted problems with:

- old brick/masonry buildings (27%);
- proximity to fault (18%);
- possibility of major damage to critical facilities (10%); and
- curtailment of water supply and resultant fire hazard (8%).

TABLE 7: SERIOUSNESS OF EARTHQUAKE HAZARDS
(Scale: 1 = Extremely serious problem to 4 = not at all a problem)

Hazard	Mean Response of Company Officials for Facilities Owned or Occupied	Mean Response of Design Professionals for Facilities Designed
Proximity to fault	2.2	1.8
Floods due to dam or dike failure	3.2	2.8
Weak soil under building foundations	3.0	2.3
Earthquake-triggered landslides	3.5	2.4
Tilt-up concrete structures	3.0	2.8
New high-rise buildings	3.2	2.7
Old brick/masonry buildings	3.2	2.0
Possibility of major damage to "critical" facilities - hospitals, dams, etc.	2.5	2.1
Curtailment of water supply and resultant fire hazard	2.3	2.2
Containment of hazardous materials	3.0	2.7
Inadequate emergency plan	2.7	2.4
Poor emergency communications	2.7	2.5
Inadequate emergency drills	2.6	2.4
Insufficient emergency personnel	2.6	2.5
Inadequate emergency evacuation procedures	2.6	2.4
Disruption of power	2.2	2.1
Potential loss of data or records	2.4	2.6

EARTHQUAKE HAZARD MITIGATION

In addition to these four general questions on their perceptions of hazards, those surveyed were asked several questions related to policies and programs for mitigating earthquake hazards.

First, all surveyed were asked the general question on how they would describe their company's state of preparedness for an earthquake that causes moderate to severe property damage on a scale of:

- o 1 = very well prepared;
- o 2 = reasonably prepared;
- o 3 = not very well prepared; and
- o 4 = not at all prepared.

Both the company officials and design professionals rated their preparedness as between reasonably prepared and not very well prepared (mean response = 2.4).

Next, the survey participants were asked to indicate those policies and practices their company has instituted or revised in the past five years. Because of the time frame specified in the question, these responses do not indicate all of those programs and policies which exist, but rather the programs where there is current activity. The company officials noted those programs with respect to typical facilities they occupy or own, while the design professionals noted those programs with respect to facilities they help design. The participants then were asked which of the programs related primarily to seismic safety. Finally, they were asked for which of the programs their company's legal counsel was consulted to gain insight on potential liability implications prior to the decision to institute - or not institute - such a program or policy. The results are shown in Tables 8 and 9. The company officials are less likely to have instituted or revised a program primarily for seismic safety reasons than the design professionals. However, they were more likely to have consulted legal counsel prior to acting or not acting.

When asked if they had revised or instituted any other policies or practices due primarily to concern for seismic safety, 28% of the company officials surveyed and 20% of the design professionals indicated that they had done so. The programs most often listed by company officials and design professionals (with number of occurrences in parentheses) often listed were:

- o upgraded portions of emergency plans, procedures or capabilities (15);
- o use of careful design, higher than code requirements, or state-of-the-art design practices (13);
- o use of techniques to tie down equipment and tie together components of existing structures for retrofitting (7); and
- o promoting public and corporate awareness of earthquake hazards through community organizations, speaking or publications (4).

TOTAL RESPONDENTS = 65

TABLE 8: NEW POLICIES AND PRACTICES INSTITUTED BY
COMPANIES FOR FACILITIES OCCUPIED OR OWNED

Program	Percent Instituted in Past Five Years	Percent Revised in Past Five Years	Percent Related to Seismic Safety	Percent Legal Counsel Consulted
Facilities inspection programs	28%	41%	15%	13%
Special facilities design requirements	26	28	17	8
Hazardous structure abatement programs	12	20	4	5
Posting of signs on dangerous structures	8	13	2	4
Soil studies for new construction	25	26	13	5
Geotechnical studies for new construction	13	22	13	6
Disclosure requirements about hazards	14	14	4	5
Reconstruction/rehabilitation plans	12	12	6	0
Facility <u>design</u> review prior to acquisition	16	25	8	2
Review of facility or site <u>location</u> prior to acquisition	17	28	12	5
Redundancy of data or record storage/ processing	20	28	1	1

TABLE 9: NEW POLICIES AND PRACTICES
INSTITUTED BY DESIGN PROFESSIONALS FOR FACILITIES DESIGNED

Program	Percent Instituted in Past Five Years	Percent Revised in Past Five Years	Percent Related to Seismic Safety	Percent Legal Counsel Consulted
Facilities inspection programs	17%	36%	21%	3%
Special facilities design requirements	24	46	37	7
Hazardous structure abatement programs	15	18	15	5
Posting of signs on dangerous structures	9	12	7	5
Soil studies for new construction	24	51	28	3
Geotechnical studies for new construction	22	52	37	4
Disclosure requirements about hazards	18	23	18	5
Reconstruction/rehabilitation plans	18	27	21	3
Facility <u>design</u> review prior to acquisition	15	18	14	3
Review of facility or site <u>location</u> prior to acquisition	13	28	13	3
Redundancy of data or record storage/processing	9	18	5	2

Next, the survey participants were asked what two things listed in the previous question (see Tables 8 and 9) that were not being done by their company that they considered the most important. The company officials most often noted (with number of occurrences in parentheses):

- facilities inspection programs (15);
- redundancy of data or record storage/processing (10);
- special facility design requirements (8); and
- reconstruction/rehabilitation plans (8).

TOTAL RESPONSES = 55

The design professionals most often noted:

- facilities inspection programs (21);
- redundancy of data or record storage/processing (14);
- hazardous structure abatement programs (11); and
- special facility design requirements (9).

TOTAL RESPONSES = 88

Reasons for not taking such actions listed by the company officials were:

- action not perceived necessary or important by others (16);
- inertia, apathy and lack of interest (11);
- lack of money (7); and
- lack of time and personnel (3).

TOTAL RESPONDENTS = 50

Reasons for not taking such actions listed by the design professionals were similar and included:

- economics (no money, budget, financing or resources) (16);
- lack of expertise or beyond area of specialization (12);
- the client or corporate management (largely due to monetary constraints) (10);
- lack of time, effort or personnel (10);
- politics (including the public and elected officials) (5); and

- apathy, inertia, and lack of urgency (4).

TOTAL RESPONDENTS = 77

When asked if, within the past 10 years, any proposed project has been internally disapproved or significantly changed for reasons of seismic safety, more than three times the percentage of design professionals responded affirmatively than company officials surveyed (55 percent to 17 percent). However, only 30 percent of the design professionals noted that their company has a disaster response plan which takes into account earthquakes, compared to 45 percent of the company officials surveyed. Components listed by the company officials include:

- emergency and earthquake plans, including operations, evacuation routes and fire control (33);
- emergency medical expertise (18);
- centralized or specialized emergency communications (17);
- practice drills (17);
- specified emergency operations center (13);
- specified emergency personnel or assignments (5);
- emergency utilities (power, water) (4);
- emergency equipment and suppliers (3); and
- specialized chemical or hazardous material containment (3).

TOTAL RESPONSES = 122

Components of that disaster plan commonly listed by the design professionals include:

- specialized emergency communications (19);
- first aid and emergency medical expertise (15);
- specified control or operations center (15);
- evacuation plans, routes and practice drills (13);
- building damage assessment (8);
- specified emergency personnel and management succession (6);
- participation by employees in Office of Emergency Services activities (5);
- emergency utilities (power, water) (4); and
- lists of emergency supplies, equipment and contract personnel (3).

TOTAL RESPONSES = 119

Cross-comparisons were made between the level of company preparedness believed to exist by company officials surveyed and each of the following:

- whether or not the company had changed projects for seismic concerns;
- whether or not the company had a disaster response plan which included earthquakes.

No strong correlations exist. Such was not the case when a similar comparison was made of the responses of the design professionals on the level of preparedness against internal changes in projects, although a relationship does exist between the level of preparedness and the occurrence of a disaster response plan. Relationships exist between the company's priority of seismic safety and whether or not projects had been internally changed for both groups surveyed.

EARTHQUAKE PROBABILITY AND PREPAREDNESS

The survey responses of company officials on the likelihood of a major earthquake were compared against each of the following:

- the priority of seismic safety in the company;
- their perceived preparedness for such an earthquake;
- internal project changes due to seismic safety; and
- the existence of a disaster response plan.

No strong relationships were found. Four similar comparisons made on the responses of the design professionals also showed no strong relationships. Although surprising, this is consistent with the perception of most (60%) company officials interviewed at sites of recent earthquakes in that the earthquake had not changed their company's preparedness for such events. Many of those noting changes believed that earlier earthquakes had more of an effect. The continued earthquake coverage by the news media was also given credit for maintaining continued earthquake awareness. The remainder citing changes were likely to have had their building or facility damaged and believed that because they had fixed the defects (in a manner often beyond that required by law), their company was now better prepared. Such changes included stacking supplies lower, tying down shelving, modifying light fixture supports, tilting shelving to reduce spillage, tying older tilt-up concrete structures together and increasing the thickness of tank walls. A final piece of evidence pointing to the small effect of earthquakes on preparedness of companies was provided by large companies interviewed with branches in areas of recent earthquakes. They noted no increased desire on the part of these branch managers to increase preparedness beyond that of all branch management.

In contrast, design professionals who believed that earthquakes were most probable were also most likely to believe that their company was prepared.

VARIATIONS IN PREPAREDNESS BY TYPE OF COMPANY

An effort was made to test if any relationship exists between the overall level of earthquake preparedness and various types of companies. Comparisons of the survey responses of company officials on the questions regarding awareness of earthquakes and preparedness for earthquakes showed no clear trend with one exception; hospital officials ranked their company higher than the average official in terms of each of the following:

- the priority of seismic safety;
- the overall state of preparedness for an earthquake;
- the likelihood that a project had been changed internally for reasons of seismic safety; and
- the existence of a disaster response plan which takes earthquakes into account.

Surprisingly, officials surveyed of utility, communication and transportation services did not rank their companies higher than the average company official surveyed.

There was a mixed response of other company officials surveyed and the reasons for this became clear in the interviews. The emphasis of earthquake preparedness programs tends to vary by the type of business or industry. Earthquake safety programs of mining, construction material, chemical, manufacturing, high technology, and agricultural industries tend to emphasize worker safety, evacuation plans and drills, emergency medical capabilities and fire control. Types of safety programs of smaller business offices emphasize third party safety, insurance and redundancy of record keeping. Businesses in high-rise office buildings, however, often had evacuation plans and drills, emergency medical capabilities (often including in-house employees certified to teach first aid and CPR), and personnel trained in fire control. Larger companies, regardless of type of company, who could afford to have at least one person whose primary responsibility was safety or disaster preparedness, tended to have programs which were more comprehensive, more formal, and well documented. Retail service businesses also tended to have relatively comprehensive programs because of their concerns with both worker safety and third parties (customers or visitors). The companies interviewed having the most comprehensive programs were those that were most highly regulated and included hospitals, utilities, and companies handling large amounts of hazardous or nuclear materials.

MOTIVATIONS FOR EARTHQUAKE PREPAREDNESS

As previously mentioned, recent earthquakes were not a primary motivation for earthquake preparedness on the part of companies. Liability was also viewed as having a secondary impact that was small to insignificant by those company officials who were interviewed. Motivations cited by the company officials interviewed for initiating or expanding such programs included the following.

1. The obvious need to comply with regulations. (Such requirements included those of OSHA and of the Uniform Building Code.)
2. Concern for worker safety. (Company officials regarded their fellow workers as friends and close associates. They had a genuine concern for not wanting to see them injured or killed.)

3. Employee morale. (Company officials noted improvements in employee morale and productivity, as well as in union-management relations, when safety programs were jointly handled by management and employees with strong management leadership.)
4. Concern for public safety. (This concern for visitors, customers and by-standers was noted more by the service businesses than by the industrial companies.)
5. Good business practice or wise financial management. (This motivation was two-sided. First, the company officials wanted to minimize damage to the company's investment in buildings and equipment. Worker safety was even included in this category by some company officials. As they put it, the time and money required to recruit and train qualified personnel was substantial. Second, the officials noted the financial need to continue in business or continue to provide a service, thereby enabling them to collect their fees.)
6. Public relations. (The aspects of acting, or not acting, responsibly and subsequent media attention was a primary concern of large or visible companies.)
7. Aggressive programs of insurance carriers or local government fire departments. (Insurance carrier or fire department inspectors, if knowledgeable in disaster preparedness, can have an active role in making constructive suggestions to companies on improving their programs.)
8. Leadership. (Key company officials who are personally committed to earthquake or disaster preparedness can provide needed leadership. Two primary reasons for such commitment that were cited in the interviews were: (1) participation on the board of directors or previous employment with companies which had strong disaster programs; and (2) having close friends or relatives who had been killed or injured due to a lack of strong safety and disaster programs.)

PERCEPTIONS OF LOCAL GOVERNMENT STAFF

The extent of safety and disaster programs of those companies interviewed tended to be broader and more complete than imagined by local government staff. There was a great amount of cynicism on the part of these people. They often viewed regulations as the only motive for private sector preparedness. However, these people noted that some action had been taken by hospitals, as well as utility, transportation and communication services. Some also noted activities by certain other companies, usually those which were large and visible. Commonly, these government agencies had disaster and earthquake preparedness education programs that were not utilized by companies. Some staff cited the problem of company officials believing in the theory of "structural Darwinism"-- that is, if the building is still standing, it must be safe.

LIABILITY KNOWLEDGE AND CONCERN

Those company officials and design professionals surveyed and interviewed were asked a series of questions related to:

- their concern for liability for earthquake hazards;
- their understanding of liability in general;
- any perceived uncertainty about general liability; and
- their perceptions of liability for earthquake hazards.

In addition, information was obtained on the impact of liability on earthquake hazard reduction through responses to questions in the interviews and by comparing the responses to questions in the surveys.

CONCERN FOR LIABILITY FOR EARTHQUAKE HAZARDS

Forty percent of the company officials surveyed noted that they had observed concern about potential liability for earthquake hazards within their company. Approximately the same percentage (38%) of the companies interviewed stated their concern. For most of those surveyed (72%), the lack of concern was felt to be because liability for such hazards had not occurred to company policy makers as an issue. An additional 18% noted that company policy makers had been advised that there was no real hazard or no real danger of liability. The remaining 10% (6 respondents) cited other reasons:

- the reason is unknown;
- liability is probably not an issue;
- liability had not come to the attention of policy makers;
- liability rules are unclear;
- the tendency is not to react until the problem hits; and
- the tendency is not to worry because there is nothing that can be done.

Those officials interviewed noted these and other reasons for their lack of concern. The most common response was that their insurance, facility design, or safety programs take care of any problem. Other responses were that:

- earthquakes are a rare occurrence;
- earthquakes are an act of God; and
- liability is of no special concern or not a big issue in decision-making.

Although most officials interviewed felt that potential liability was an effective deterrent to negligence on the part of companies, they also believed that it is not a major factor, and definitely not the only factor, in company decisions related to hazards. However, it is

noteworthy that a cross-tabulation of level of concern for liability for earthquake hazards against each of the responses on:

- the priority of seismic safety in the company for officials surveyed; and
- perceived level of emergency preparedness

showed a strong positive correlation.

On the other hand, 76% of the design professionals and all of the company officials of engineering service companies had observed a concern about potential liability for earthquake hazards within their company. This concern is especially noteworthy given the low rate at which these people consult legal counsel in making policy or program decisions about earthquake hazards (see Table 9). Of those not noting concern, 41% stated that this lack was because company policy makers had been advised that there was no real hazard or no real danger of liability. An additional 37% stated that it had not occurred to company policy makers as an issue. The remaining 21% noted other reasons, including:

- liability is not paramount or applicable to their business (4);
- earthquakes are considered acts of God (1);
- conservative or state-of-the-art practices have been used (2);
- codes or standards of the industry have been followed (2);
- hazards that can be controlled have been mitigated (2);
- liability control is a long-standing policy (1); and
- the reason is unknown (3).

TOTAL RESPONDENTS = 16

As with the company officials, a cross-tabulation of responses of the design professionals on level of concern for liability for earthquake hazards their responses on each of the following:

- the priority of seismic safety in their company; and
- perceived level of emergency preparedness

showed a strong positive relationship.

UNDERSTANDING OF TORT LIABILITY RULES

The design professionals and company officials surveyed gave similar responses on the understanding of liability rules by their company's officials. The mean response was 2.3 on a scale of:

- 1 = detailed and relatively complete understanding;
- 2 = good understanding on a few specific areas (such as worker's compensation) but poor understanding in other areas;

- o 3 = aware of issue, but relatively little understanding of details;
- o 4 = very little understanding; and
- o 5 = no understanding.

Approximately three-quarters of those surveyed characterized their understanding as accurate.

The company officials interviewed were more likely to characterize their understanding as detailed and complete. This greater understanding may be more due to ABAG's efforts to get the most appropriate people in each company to participate in the interviews, rather than any genuinely better understanding on the part of the officials.

UNCERTAINTY REGARDING LIABILITY

Those surveyed were asked if the laws relating to liability were so uncertain that it is difficult in many instances to predict the potential liability implications of their company's various activities. Thirty-one percent of the company officials and twenty percent of the design professionals felt that this was almost always the case. More (40% of the company officials and 48% of the design professionals) felt that this was the case at least sometimes. The remainder (28% of the company officials and 31% of the design professionals) had not observed any difficulties. The responses of those officials interviewed were similar. However, most of those surveyed (72% of the company officials and 47% of the design professionals) believed that uncertainty about potential liability has little or no effect on company decisions. Several of the company officials surveyed (10%) and the design professionals (29%) believed that uncertainty about potential liability contributes to the solution of problems through unwarranted concern for liability on the part of the company. Others (10% of the company officials and 7% of the design professionals) believed the opposite; that is, uncertainty about potential liability has discouraged aggressive company actions to reduce hazards. Other effects of the uncertainty mentioned by company officials in the survey and interviews included:

- o purchasing insurance (6);
- o using common sense and trying to act reasonably (5);
- o assuming liability (2);
- o contracting out high-risk work (1);
- o consulting the company attorney (1);
- o aggressively trying to mitigate any adversary environment (1); and
- o trying to settle out of court (1).

TOTAL RESPONDENTS = 20

Effects of uncertainty noted by the design professionals included:

- o turning away projects or work (5);

- increased concern for liability (2);
- trying to inform the owner/client (2);
- purchasing of insurance (1);
- unrestrained litigation (1);
- conservative design (1); and
- extensive documentation of decisions and communications (1).

TOTAL RESPONDENTS = 19

Causes for the uncertainty mentioned by the company officials included:

- unclear or inconsistent court cases, laws and standards (12);
- lack of educational information on tort liability, or a person in the company to review it (8);
- lack of court cases or laws (5);
- the infrequency and unpredictability of earthquakes (2); and
- frequent law changes, including the expansion of liability (2).

TOTAL RESPONDENTS = 42

Causes noted by the design professionals included:

- lack of specific guidelines on what to do (19);
- courts and juries deciding cases in inexplicable ways (16);
- variability of the circumstances (11);
- lack of knowledge (10);
- complicated, complex and unclear laws (7);
- lack of information (5);
- unjustified suits winning (5); and
- lack of understanding of earthquake hazards (3).

TOTAL RESPONDENTS = 84

PERCEPTIONS OF LIABILITY FOR EARTHQUAKE HAZARDS

The company officials surveyed and interviewed were asked if, based on their knowledge of current law and recent court decisions, they believed that companies in California could be held liable for a negligent failure to reduce known earthquake hazards. Those surveyed were given a scale of:

- 1 = could definitely be held liable;
- 2 = could probably be held liable;
- 3 = might or might not be held liable;
- 4 = could probably not be held liable; and
- 5 = could definitely not be held liable.

Most (56%) believed that companies could definitely or probably be held liable; the mean response was 2.5. In the interviews, the question was phrased to yield a yes or no response. The responses were as follows (with number of occurrences in parentheses):

- yes, in certain situations (depending on regulations, the standard of care used, the reasonableness of the lack of action, publicity about what could have been done, or the degree of the hazard -- such as an old brick building on a fault) (18);
- yes, if the hazard was known (8);
- yes, especially in smaller earthquakes (1);
- yes, especially for larger companies (1);
- yes (2);
- no, not for themselves (2);
- no, unless for a large company (1);
- no, at least liability not to be admitted in court (1);
- no, for earthquakes are "an act of God" (1); and
- don't know (1).

TOTAL RESPONDENTS = 36

No strong relationship could be found between those officials surveyed who believed that companies could be held liable and the degree to which these officials felt they understood liability. However, those officials surveyed who had observed concern for liability were more likely to believe that they could be held liable.

The design professionals were asked a similar question, but applying to design professionals rather than companies. Most (63%) believed that design professionals could definitely or

probably be held liable; the mean response was 2.1. No strong relationship could be found between this response and the degree to which these professionals felt they understood liability. Again, those who had observed concern for liability were more likely to believe that they could be liable.

The survey participants were asked to indicate whether or not they thought companies and design professionals would be held liable in California in seven hypothetical situations using a scale of:

- o 1 = definitely would;
- o 2 = probably would;
- o 3 = might or might not;
- o 4 = probably would not; and
- o 5 = definitely would not.

The survey results are shown in Tables 10 through 16. The responses of the company officials and design professionals are strikingly similar; both groups are often on the side of "probably would not" or "definitely would not" be held liable. A comparison of the response of hospital officials to company officials as a whole for the hypothetical situation involving a hospital showed no significant difference in mean response. Similarly, a comparison of the response of utility officials to company officials as a whole for the situation involving a utility company showed no significant difference in mean response.

A cross-tabulation between the overall combined responses to the hypothetical situations and the response to whether or not any concern for potential liability had been observed showed no significant relationship. In addition, a cross-tabulation between the overall combined responses to the hypothetical situations and the response to the question on whether or not liability could exist showed no strong pattern.

TABLE 10: RESPONSES OF SURVEY PARTICIPANTS TO
THE FOLLOWING HYPOTHETICAL SITUATION RELATED TO
AN OLDER HIGH-RISE OFFICE BUILDING

A design consultant inspecting a high-rise office building informs a company that the building is hazardous and could be damaged in an earthquake because the facility's design is now known to be inadequate for its geologic setting, even though it was felt to be safe when originally designed. The company takes no action and an earthquake then occurs, resulting in many injuries and deaths among its employees, lessees and members of the public. Building occupants trapped in the upper stories for extended periods suffer extreme psychological distress.

- a. Would the professionals who originally designed the building be held liable in California?

	<u>Company Officials</u>	<u>Design Professionals</u>
1 = Definitely Would	0%	1%
2 = Probably Would	20%	3%
3 = Might or Might Not	22%	26%
4 = Probably Would Not	45%	50%
5 = Definitely Would Not	11%	17%
Mean Response	3.5	3.8

- b. Would the design consultant be held liable in California?

	<u>Company Officials</u>	<u>Design Professionals</u>
1 = Definitely Would	1%	0%
2 = Probably Would	8%	2%
3 = Might or Might Not	18%	17%
4 = Probably Would Not	48%	48%
5 = Definitely Would Not	23%	30%
Mean Response	3.8	4.1

- c. Would the company be held liable in California?

	<u>Company Officials</u>	<u>Design Professionals</u>
1 = Definitely Would	13%	8%
2 = Probably Would	41%	44%
3 = Might or Might Not	27%	29%
4 = Probably Would Not	14%	16%
5 = Definitely Would Not	2%	1%
Mean Response	2.5	2.6

TABLE 11: RESPONSES OF SURVEY PARTICIPANTS TO THE FOLLOWING
HYPOTHETICAL SITUATION RELATED TO A NEW HIGH-RISE OFFICE BUILDING

The professionals designing a 10-story office building comply with the prescriptive standards in all local building codes as interpreted by the city staff. The professionals know, and advise the owner, that greater safety could be achieved with state-of-the-art design and construction techniques at 5 percent additional cost, but the owner elects to minimize costs. The suburban city building department approves the design. After construction and occupancy, there is a moderate-to-strong earthquake, and an expert states that significantly greater injuries and damage to property of both occupants and strangers occurred because state-of-the-art techniques were not used.

a. Would the design professionals be held liable in California?

	<u>Company Officials</u>	<u>Design Professionals</u>
1 = Definitely Would	2%	1%
2 = Probably Would	6%	6%
3 = Might or Might Not	27%	25%
4 = Probably Would Not	50%	48%
5 = Definitely Would Not	13%	18%
Mean Response	3.7	3.8

b. Would the company be held liable in California?

	<u>Company Officials</u>	<u>Design Professionals</u>
1 = Definitely Would	2%	5%
2 = Probably Would	19%	13%
3 = Might or Might Not	41%	28%
4 = Probably Would Not	30%	40%
5 = Definitely Would Not	4%	10%
Mean Response	3.2	3.4

TABLE 12: RESPONSES OF SURVEY PARTICIPANTS TO THE FOLLOWING
HYPOTHETICAL SITUATION RELATED TO AN OLD UNREINFORCED MASONRY HOTEL

The owner of a private residential hotel of pre-1933 unreinforced masonry knows that there is a significant risk of damage in an earthquake. The building owner chooses to do nothing. An earthquake occurs and there are casualties.

Would the owner be liable in California?

	<u>Company Officials</u>	<u>Design Professionals</u>
1 = Definitely Would	4%	6%
2 = Probably Would	30%	19%
3 = Might or Might Not	37%	37%
4 = Probably Would Not	24%	31%
5 = Definitely Would Not	2%	5%
Mean Response	2.9	3.1

TABLE 13: RESPONSES OF SURVEY PARTICIPANTS TO
THE FOLLOWING HYPOTHETICAL SITUATION RELATED TO
A REHABILITATED UNREINFORCED MASONRY HOTEL

The owner of a private residential hotel of pre-1933 unreinforced masonry knows that there is a significant risk of damage in an earthquake. Although the building owner is not required by the Code to do any rehabilitation, he chooses, on the advice of design professionals, to spend 10 percent of the money required for compliance with the current code to achieve 80 percent safety. An earthquake occurs and there are some severe injuries, but substantially fewer casualties than in other similar buildings where no rehabilitation had occurred.

a. Would the design professionals be held liable in California?

	<u>Company Officials</u>	<u>Design Professionals</u>
1 = Definitely Would	0%	1%
2 = Probably Would	9%	9%
3 = Might or Might Not	17%	26%
4 = Probably Would Not	56%	49%
5 = Definitely Would Not	<u>16%</u>	<u>12%</u>
Mean Response	3.8	3.6

b. Would the owner be held liable in California?

	<u>Company Officials</u>	<u>Design Professionals</u>
1 = Definitely Would	0%	1%
2 = Probably Would	16%	12%
3 = Might or Might Not	29%	31%
4 = Probably Would Not	45%	44%
5 = Definitely Would Not	<u>8%</u>	<u>9%</u>
Mean Response	3.5	3.5

TABLE 14: RESPONSES OF SURVEY PARTICIPANTS TO
FOLLOWING HYPOTHETICAL SITUATION RELATED TO
A HOSPITAL FACILITY

The private hospital board knows that its facilities are located in an area where violent earthquake shaking must be anticipated. During a moderate-to-large earthquake, the resulting ground shaking and ground displacement cause dysfunctions in use, e.g. rolling beds, destruction of pharmaceuticals, and failure of life support systems that result in injuries and death to patients and others. In addition, the hospital building is unusable for the duration of the emergency.

Would the hospital board be held liable in California?

	<u>Company Officials</u>	<u>Design Professionals</u>
1 = Definitely Would	1%	5%
2 = Probably Would	13%	25%
3 = Might or Might Not	40%	30%
4 = Probably Would Not	40%	37%
5 = Definitely Would Not	<u>3%</u>	<u>2%</u>
Mean Response	3.3	3.1

TABLE 15: RESPONSES OF SURVEY PARTICIPANTS TO
THE FOLLOWING HYPOTHETICAL SITUATION RELATED TO
A PRIVATE NATURAL GAS UTILITY

The private utility providing natural gas discovers, through a study, that, in a moderate-to-large earthquake, its emergency back-up systems would not be adequate to ensure continuing provision of natural gas for residential heating. The utility takes no effective steps to improve its emergency systems, and in the subsequent earthquake the system fails during winter, leading to the loss of life of some elderly, infirm and infants, and severe hardships for all affected users.

Would the utility be held liable in California?

	<u>Company Officials</u>	<u>Design Professionals</u>
1 = Definitely Would	2%	8%
2 = Probably Would	30%	33%
3 = Might or Might Not	34%	26%
4 = Probably Would Not	28%	30%
5 = Definitely Would Not	3%	1%
Mean Response	3.0	2.8

TABLE 16: RESPONSES OF SURVEY PARTICIPANTS TO
THE FOLLOWING HYPOTHETICAL SITUATION RELATED TO
A GOVERNMENTAL EARTHQUAKE WATCH

A government agency issues a watch that the chance of an earthquake in the area has increased from 1 percent per year to 20 percent per year. The State Office of Emergency Services advises people and companies that they should prepare for a possible earthquake, and should take steps necessary for self-sufficiency for three days. A company that is aware of the advice does nothing. A major earthquake occurs and traps employees and visitors for three days. Injuries and illnesses are aggravated, there is extreme distress, and some deaths result from inadequate first aid supplies, food and water.

Would the company be liable in California?

	<u>Company Officials</u>	<u>Design Professionals</u>
1 = Definitely Would	2%	5%
2 = Probably Would	30%	32%
3 = Might or Might Not	43%	38%
4 = Probably Would Not	19%	21%
5 = Definitely Would Not	3%	3%
Mean Response	2.9	2.9

IMPACT OF LIABILITY ON HAZARD REDUCTION

Many of the company officials interviewed, as well as the attorneys surveyed, were asked a series of questions related to the effect of liability rules on company activities.

First, they were asked how liability rules, in general, affect officials in their company in the performance of their duties. Responses (with number of occurrences in parentheses) were as follows:

- they usually recognize liability issues and act reasonably to avoid exposure (25);
- they usually recognize liability issues, but are unconcerned about them (2); and
- they are occasionally impeded in the performance of their duties by an over-concern with liability (10).

TOTAL RESPONDENTS = 37

In 8 of these 10 cases, the participants cited a specific example not related to safety. In the remaining 2 cases, the officials talked generally about the need to be overly careful, the increase in paperwork, and the reduction in flexibility.

Most of the officials interviewed, when asked, were able to state specific company strategies to reduce or minimize liabilities found in California tort law. The strategies include:

- improving safety (8);
- contracting out as much as possible or making someone else responsible (4);
- buying insurance (4);
- acting reasonably (3);
- working with industry, governmental or political groups to make regulations more responsive to their concerns (3); and
- trying to settle out of court (2).

TOTAL RESPONDENTS = 24

Only twice were no specific strategies mentioned.

No company officials interviewed noted that their company had ever chosen not to pursue activities which would have substantially benefited the public safety because of concern for liability exposures. In only once case had the company attorney counseled that such actions would have increased potential liability. However, the program was undertaken anyway. These responses are consistent with the relationship noted earlier -- that is, that those noting concern for liability for earthquake hazards also tended to believe that seismic safety was a higher priority in their company and that their emergency preparedness program was stronger.

Six additional cross-tabulations of the responses of company officials surveyed and design professionals were generated for:

- the degree of liability believed could exist for earthquake hazards; and
- perceived uncertainty in general liability laws

against each of three measures of earthquake hazard reduction:

- the priority of seismic safety within the company;
- the company's perceived earthquake preparedness; and
- the existence of a disaster response plan which takes earthquakes into account.

No consistent relationship could be found between perceived degree of liability or uncertainty and a company's awareness of or response to earthquake hazards.

LIABILITY INSURANCE AND RISK MANAGEMENT

Those company officials surveyed and interviewed, as well as the design professionals, were asked a series of questions related to:

- liability insurance coverage;
- earthquake insurance;
- insurance for consequential economic loss; and
- risk management.

Risk management consists of analyzing possible losses and determining how to handle these exposures through reducing, eliminating, or transferring (usually through insurance) the risks.*

The design professionals were asked two additional questions regarding professional liability insurance and disclaimers describing risk of damage.

Information was obtained on the impact of insurance and risk management on hazard reduction and awareness of liability by comparing responses to questions in the survey. Responses to direct questions relating to the relationship between insurance or risk management and hazard reduction or liability were also analyzed.

INSURANCE COVERAGE

When asked about tort liability insurance, rather than professional liability insurance, survey and interview participants noted a variety of programs as described in Table 17.

*Based on the definition of "risk management" found in the Glossary of Insurance Terms (Edited by Thomas E. Green, 1980, Merritt Co., Santa Monica).

TABLE 17: TORT LIABILITY INSURANCE COVERAGE

Type of Insurance	Company Officials	Design Professionals	Companies Interviewed
Company is self-insuring for tort liabilities	22%	25%	3%
Company is self-insuring, more than \$50,000/occurrence, but has excess liability insurance	18%	5%	47%
Company has a standard policy with a deductible less than \$50,000/occurrence	29%	38%	38%
Company has a standard general liability insurance policy with no deductible provisions	18%	22%	6%
None of the above apply	12%	10%	6%

Those noting self-insurance with excess liability coverage listed amounts for that coverage of:

- less than one-half million (4);
- \$1 million to \$5 million (10);
- \$10 million to \$50 million (7); and
- over \$100 million (3).

TOTAL RESPONDENTS = 24

Other insurance programs described included:

- percentage deductibles;
- deductibles in the range of \$100,000 to \$200,000 that were not perceived to constitute self-insurance; and
- insurance through the client or builder.

Next, participants were asked if their company carried earthquake insurance for damage to its property. Thirty-two percent of the company officials surveyed, 68% of those interviewed, and 8% of the design professionals noted such coverage. (These percentages exclude the many participants who did not know whether or not such coverage existed.)

Those companies surveyed that were classified as retail service were most likely to carry earthquake insurance.

When asked about insurance coverage for consequential economic loss, 54% of the company officials surveyed, 77% of those interviewed, and 9% of the design professionals noted such coverage. (Again, these percentages exclude those not responding.)

When asked if their company carried professional liability insurance covering earthquake damage to facilities their company designed, 45% of the design professionals responded affirmatively.

Thirteen percent of the design professionals noted that they had been advised by their company insurance carrier, risk manager or attorney on appropriate caveats and disclaimers in describing risk of earthquake damage. Such advice consisted of:

- never use terms such as "earthquake proof";
- use all techniques recommended by the Design Professionals Insurance Corporation;
- in the remodeling or rehabilitation of existing buildings, state that certain necessary assumptions can't be entirely verified; and
- use statements in their reports which describe geo-technical study limitations and possible risks to owner/developer.

RISK MANAGEMENT

Thirty-seven percent of the company officials surveyed, 55% of those interviewed, and 26% of the design professionals indicated that their company had a formal total risk management program. (Earthquake hazards were not necessarily one of the specific sources of loss analyzed as part of that program.)

The components of risk management programs are described in Table 18.

TABLE 18: RISK MANAGEMENT PROGRAM COMPONENTS

Component/Result	Company Officials	Design Professionals	Companies Interviewed
Components:			
Evaluation of liability exposures for inclusion as a factor in decision-making	74% (26%-- sometimes)	60% (33%-- sometimes)	90%
A safety program aimed at liability exposures for current or future activities	75%	72%	100%
Classes, seminars or written materials on liability	41%	51%	82%
Claim monitoring and review procedure to provide information for use in taking preventive or corrective measures	92%	65%	100%
Results:			
Reduction in liability insurance costs	72%	63%	56%
Reduction in liability claims, other things being equal	45%	25%	46%

Insurance cost reductions noted ranged from 10% - 50%. Several of the company officials interviewed felt that their risk management programs had been successful because they had kept insurance costs stable.

Of those companies surveyed, hospitals and general service companies were most likely to have risk management programs. Those classified as contracting, development, real estate and property management were least likely to have such programs. Comparisons of survey responses of company officials indicated that risk management is more prevalent with companies which self-insure as opposed to those with standard insurance coverage.

INSURANCE AND RISK MANAGEMENT AS FACTORS IN HAZARD REDUCTION

In order to gain some insight on the relationship between insurance and hazard reduction, the attorneys surveyed, as well as most of those companies interviewed, were asked whether they agreed or disagreed with the following statement:

A company insured against earthquake damage under its insurance policy (where the insurance company defends and pays claims and there is no deductible) is less concerned about hazard abatement than a company without such insurance, or that is self-insured.

Most (63%) disagreed, 23% agreed, and 14% stated that they both agreed and disagreed, depending on the situation. Although the responses were quite mixed, the rationales for answering in a given manner pointed toward a general consensus. Such insurance might tend to take away some economic incentive to reduce hazards, especially if the company were small and insurance premiums did not vary with hazard levels. There might also be a tendency to cede hazard reduction responsibility to the insurance carrier. However, many reasons were given that more than balanced these disincentives to hazard reduction:

- insurance companies usually have strong programs to encourage safety;
- insurance costs are usually tied to hazard reduction;
- safety, continued service or production, and protection of property and image are the goals of hazard reduction, not insurance costs; and
- insurance is the last resort if a company does not want to gamble.

In an additional effort to determine the nature of any relationship between insurance and hazard reduction, several comparisons were made on the responses of the survey participants.

Those surveyed, including both company officials and design professionals, who worked for a company that was largely self-insured for tort liabilities were significantly more likely to note each of the following:

- their company was well prepared for an earthquake; and
- their company had a disaster plan which incorporated earthquakes.

No significant relationship existed between such insurance and whether or not a project had been internally modified due to seismic safety concerns, however.

Company officials surveyed who worked for a company that had earthquake insurance were significantly more likely to note each of the following:

- their company was well prepared for an earthquake;
- projects had been changed due to seismic concerns; and
- the company had a disaster plan.

Such a relationship between earthquake insurance and perceived earthquake preparedness did not exist for the design professionals, however.

The survey and most interview participants who worked for companies with risk management programs were asked if the awareness of hazards had increased since the program began. Only 50% of the design professionals responded that it had increased, while 62% of the company officials surveyed and 91% of those interviewed noted the increase. These responses are consistent with comparisons of the responses to survey questions on risk management and hazard mitigation. There were strong correlations between those officials surveyed working for companies that had risk management programs and those who noted each of the following:

- their company was well prepared for an earthquake;
- projects had been modified due to seismic safety; and
- their company had a disaster plan.

Similar relationships between risk management programs and perceived earthquake preparedness and disaster plans were weak to insignificant for the design professionals. Companies where these professionals worked were more likely to modify projects internally if they had a risk management program, however.

Finally, a comparison was made between the responses of those company officials surveyed who noted that the risk management program had increased hazard awareness and each of these three measures of earthquake hazard mitigation activity. The correlation between believing risk management increased hazard awareness and that their company was well prepared was exceptionally strong. While the correlation with companies who had modified projects due to seismic safety was also significant, that with the existence of a disaster plan was surprisingly insignificant. (Similar correlations for design professionals could not be made due to the small sample size.)

THE EFFECT OF INSURANCE AND RISK MANAGEMENT ON CONCERN FOR AND PERCEPTIONS OF LIABILITY FOR EARTHQUAKE HAZARDS

In order to gain some insight into the relationship between insurance and views on liability for earthquake hazards, several comparisons were made on the responses of the survey participants. No significant relationship could be determined between companies which self-insured and either of the following:

- how officials of such companies perceived the degree of concern for liability for earthquake hazards; or
- the extent to which they believed such liability could exist.

However, a strong correlation exists between companies which carry earthquake insurance and each of the above two measures of concern for and a greater degree of liability for earthquake hazards. Design professionals who work for companies which carry professional liability insurance covering damage to facilities their company designed are more likely to believe that design professionals could be held liable for damage in an earthquake, even though concern for such liability is not significantly greater than for other design professionals.

The survey participants and most officials interviewed who worked for companies with risk management programs were asked if that program had increased the awareness of their company's officials of liability as a factor in decision-making. Fifty-nine percent of the company officials surveyed believed that it had increased such awareness significantly, while the remainder believed that awareness had not increased too much. Of the design professionals, 54% believed that it had increased awareness to a substantial degree, 39% believed that awareness had not increased too much and the remainder had observed no increase. Of those officials interviewed, 82% had observed an increase in awareness.

Comparisons of survey responses indicated that company officials and design professionals who worked for companies with risk management programs were more likely to have

observed concern for liability for earthquake hazards than those working for companies without such programs. The design professionals working for companies with risk management were more likely to believe that less liability exists for earthquake hazards, while the company officials were not significantly more likely to have this perception.

Finally, a comparison was made between the survey responses of company officials who noted that their company's risk management program had increased liability awareness and each of the following:

- concern for liability; and
- existence of liability.

Such officials were more likely than the group to believe that liability for earthquake hazards could exist, but were not significantly more likely to have observed concern for liability. (Again, similar correlations for design professionals could not be made due to the small sample size.)

A FINAL NOTE ON RISK MANAGEMENT PROGRAMS

In the interviews with officials of companies with risk management programs, an interesting observation could be made. Risk management programs could be initiated out of concerns for hazards or out of concerns for liability or both. Sometimes the programs were never able to bridge the gap so that company officials were able to perceive any strong relationship between reductions in hazards and reductions in liability exposure.

ATTITUDES TOWARDS TORT LIABILITY

Finally, those surveyed and interviewed were asked a series of questions aimed at determining their attitudes toward tort liability and its potential use in more effectively promoting earthquake hazard reduction.

SHOULD LIABILITY FOR EARTHQUAKE HAZARDS EXIST?

The company officials surveyed and interviewed were asked if a company should be held liable if its negligent failure to initiate corrective or preventive measures causes or makes more likely the loss of life or property damage resulting from earthquake hazards. Those surveyed were given a scale of:

- 1 = should definitely be held liable;
- 2 = should probably be held liable;
- 3 = depends on the situation;
- 4 = should probably not be held liable; and
- 5 = should definitely not be held liable.

Many officials surveyed (41%) believed that such a company probably or definitely should be held liable. Only 7% believed the company probably or definitely should not be held liable. The remainder indicated that it should depend on the situation. The mean response was 2.6. In the interviews, the question was phrased to yield a yes or no response. Responses were as follows (with number of occurrences in parentheses):

- yes, especially if mitigation were within reason (that is, reasonable for a known hazard, a probable situation, and an affordable cost) (27);
- yes, since the standards of reasonableness and negligence are workable (2);
- no, since companies should act for other reasons (1);
- no, since earthquakes are clearly an "act of God" (1);
- do not know, question applicability of an "act of God" defense if the hazard is known (2); and
- refused to answer (1).

TOTAL RESPONDENTS = 34

No significant relationship could be found between the responses of company officials surveyed to this question and whether or not they had observed concern for liability for earthquake hazards within their company. As might be expected, there was a very strong positive correlation between those officials surveyed who felt that liability should exist and those who indicated earlier that liability could exist for known earthquake hazards.

The design professionals were asked a similar question, but regarding the negligent failure of a design professional to advise a client. Most (56%) believed that he should definitely or probably be held liable. Again, a very small percentage believed that he definitely or probably should not be held liable. The mean response was 2.27. Again, no relationship exists between those design professionals who believed that liability should exist and those that had observed concern for liability for earthquake hazards within their company. Also, there was a strong positive correlation between those who felt that liability should exist and those who indicated that liability could exist.

ATTITUDES TOWARD CHANGES IN LIABILITY RULES

All those surveyed and interviewed were asked the general question:

If you were to assume that more private sector action is desirable to reduce earthquake hazards -- which course of action do you think would be most effective?

Provided with the following three alternatives, the company officials surveyed responded:

- making companies more liable than now (43%);
- leaving some degree of liability and immunity as currently exists (50%); and
- making companies more immune than now (6%).

The officials of engineering services companies surveyed were most likely to be in favor of increasing liability, while the officials of retail service companies surveyed were most likely to be in favor of increasing immunity. The design professionals, given slightly different alternatives, responded:

- making design professionals more liable than now (20%);
- leaving some degree of liability and immunity as currently exists (67%); and
- making design professionals more immune than now (12%).

The company officials interviewed were more in favor of leaving the same degree of liability and immunity as currently exists (90%).

Following this question, a different approach was used in the surveys than in the interviews. In the surveys, two questions were asked about increasing liability and two were asked about increasing immunity.

First, the company officials surveyed were asked whether they thought that companies would do more or do less to reduce earthquake hazards than they are doing now if, by statute, companies were explicitly declared liable for their failure, negligent or intentional, to take actions to reduce such hazards, given a scale of:

- 1 = would definitely do more than now;
- 2 = would probably do more than now;
- 3 = would stay the same;

- o 4 = would probably do less than now; and
- o 5 = would definitely do less than now.

Most of these officials believed that companies definitely or probably would do more than now (86%) for a mean response of 2.0. As might be expected, there was a strong correlation between those believing liability would encourage companies to do more than now and those believing increasing liability is the most effective alternative to encourage hazard reduction. The design professionals, given a similar question regarding a design professional and his advising a client to take such actions, also tended to believe that they would probably do more than now (mean response = 2.0). Again, there was a strong correlation between those believing liability would encourage design professionals to do more than now and those believing increasing such liability is the most effective alternative to encourage hazard reduction.

Secondly, the company officials surveyed were asked if they personally favored increased liability for companies as a means of encouraging them to reduce risks from earthquake hazards. Twenty-eight percent responded yes, 34% felt that they favored increased liability only in some instances, and 36% responded no. The specific instances provided (with number of occurrences in parentheses) included:

- o where it's economically feasible to reduce a likely hazard, or under reasonable circumstances (5);
- o where building code or design standards are not adhered to (4);
- o if the company is negligent (3);
- o only in areas where major hazardous conditions exist, such as on or near a fault (2);
- o when risk is increased or developed (1);
- o after inspection and warning (1);
- o when there is a large employee exposure (1); and
- o when there is major damage potential to the surrounding community (1).

TOTAL RESPONDENTS = 20

In this instance, officials of hospitals surveyed were most likely to be personally in favor of increasing liability, while officials of retail service businesses surveyed were least likely to be personally in favor of such action. As might be expected, those officials surveyed who were personally in favor of increasing liability also were more likely to believe each of the following:

- o liability would be more effective than immunity in encouraging hazard reduction; and
- o if liability were increased, companies would do more than they are doing now.

The design professionals were asked a similar question regarding personally favoring self-liability. Only 18% responded yes, 20% felt that they favored increased liability only in some instances, and 60% responded no. The most common specific instances for increased liability included:

- when negligence or disregard can be demonstrated (7);
- when serious physical harm is probable during a major earthquake or some other standard of risk is established (5); and
- failure to follow building code standards, Structural Engineers Association of California recommendations, or well-established design principles with known consequences of failure to conform (3).

TOTAL RESPONDENTS = 33

Again, as might be expected, those design professionals who were personally in favor of increasing liability for design professionals also were more likely to believe each of the following:

- such liability would be more effective than immunity in encouraging hazard reduction; and
- if liability were increased, design professionals would do more than they are doing now to reduce earthquake hazards.

Third, all those surveyed were asked if they would favor a state-mandated program requiring private sector improvement of dangerous facilities which allowed a grace period of immunity before the owner becomes subject to potential liability, given a scale of:

- 1 = definitely would favor;
- 2 = probably would favor;
- 3 = might or might not favor;
- 4 = probably would not favor; and
- 5 = definitely would not favor.

The mean response of the company officials was 2.8 (i.e., between probably would favor and might or might not favor). The design professionals were more likely to be in favor of such a program (mean response = 2.2). Of the company officials surveyed, those of hospitals were most likely to favor such a program and those of utility, communication and transportation services were least likely to favor such a program. In spite of the fact that this program offers immunity, those surveyed who indicated that they believed that increasing liability would be more effective than increasing immunity in promoting hazard reduction were significantly more likely to favor this program than those who indicated the opposite response.

Fourth, to test to see if state legislation allowing communities (cities and counties) in California to require upgrade of private buildings to a life-safety standard rather than full

current Uniform Building Code compliance were well known, those surveyed were asked if there was such a law. Only 43% of the company officials and 40% of the design professionals were aware of the law, with 40% of the company officials and 28% of the design professionals not answering the question (many indicating in writing that they did not know the answer). Since such legislation might be incorporated into a state-mandated program requiring private sector improvement of dangerous facilities, such confusion is noteworthy.

The format of the interview sessions was much different than for the survey questionnaire allowing for a much broader review of potential strategies to promote earthquake hazard reduction.

As previously mentioned, most of those asked in the interviews (26/29) believed that liability rules should not be changed. The remaining three favored increasing liability if the hazard were known and a simple mitigation measure available. Two of these believed that increasing immunity for certain actions might also be worth considering. All believed that other courses of action would be more worthwhile, citing the following (with number of occurrences -- totalling 53 -- in parentheses).

1. Educate (13). Company officials should be educated as to their potential liability. Guidelines should also be available on potential deaths and injuries for certain hazards, available means to better prepare for earthquakes, and cost information on mitigating hazards or implementing earthquake safety programs.
2. Upgrade building codes and ordinances (10). Candidates for retrofitting included older tilt-up concrete buildings, unreinforced masonry buildings, and mobile home foundations. Candidates for fastening included mechanical and electrical equipment, utilities (largely water and power lines), and furnishings (especially if large and heavy).
3. Use financial incentives (10). Emergency preparedness activities might be tied to tax cuts, interest free loans, or cuts in insurance premiums. One interesting rationale for government spending the money for such incentives was that industry would be reducing the amount that government agencies would ultimately be spending on emergency preparedness and disaster recovery programs.
4. Work with business and professional groups (6). Such groups might include local Chambers of Commerce, manufacturers associations, savings and loan organizations, insurance organizations, and civil, structural and geotechnical engineering professional associations.
5. Use inspections (4). More inspections by insurance and local government staff trained in earthquake safety would be useful, especially if coupled with seminars on how to fix the problems and promote safety. Some suggested that any changes should be voluntary.
6. Focus on emergency training and extensive drills (4).
7. Work for better public/private cooperation (3). These officials saw a lack of understanding of the business community and unfounded expectations on the part of government agencies on appropriate disaster preparedness activities. They also saw a lack of governmental leadership in this area.

8. Require earthquake insurance (2). These officials were impressed by the safety programs required by their insurance carriers.

9. Work with the media (1). Although working with the news media to promote continued awareness of earthquake hazards was only mentioned once in the direct context of recommended strategies, several company officials, especially in southern California, pointed to the role of the media in maintaining earthquake awareness.

In spite of the reluctance to use liability rules as a means of promoting earthquake hazard reduction, many of the officials interviewed were asked for their opinions on specific proposals.

Those officials asked about a program to offer immunity for actions not taken to reduce hazards believed that companies' activities would not change and that such a program, therefore, would be useless. When the officials were asked about a program to offer immunity for actions taken to reduce hazards, a variety of responses were given:

- o favor; companies would do more for this program would stimulate risk management (2);
- o favor; companies would do more, especially if companies were given guidelines on what could be done (3); and
- o do not favor; companies would not do more (10) (also mentioned -- media attention on such legislation would just encourage more off-the-wall lawsuits).

TOTAL RESPONDENTS = 15

Several officials were asked if they would favor a state-mandated program requiring private sector improvement of dangerous facilities which allows a grace period of immunity before the owner becomes subject to potential liability. The following responses were given:

- o favor (5);
- o consider; depending on the standard established for what is hazardous, any financing available, and the "grace period" established (including options of varying it with the number of people exposed or having upgrade required only at time of sale) (9);
- o do not favor; a hardship on small business (3); and
- o do not favor; a nightmare of setting standards, testing reasonableness, and administering the program (1).

TOTAL RESPONDENTS = 18

Finally, several officials were asked if they would favor a change in tort liability law which specified strict, but limited, liability for earthquake hazards and losses, similar to that provided by workers' compensation and for nuclear power plant accidents. The following responses were given:

- o favor (2);

- consider; if it did not make codes retroactive in exchange, if it limited suit-happiness, or if it continued to promote safety (5);
- do not favor (2); and
- do not favor; since such a program would not encourage safety, but just make decisions easier for insurance and risk management personnel (7).

TOTAL RESPONDENTS = 16

BACKGROUND RESEARCH REPORT 5

APPROACHES FOR IMPROVING TORT LIABILITY EFFECTIVENESS IN PROMOTING EARTHQUAKE SAFETY

June 1984

Association of Bay Area Governments

CREDITS

PROJECT PARTICIPANTS

JEANNE PERKINS - Project Manager; ABAG Earthquake Program Manager
KENNETH MOY - ABAG Legal Counsel
DOUG DETLING, RICHARD EGGERTH, MARCI LOSS

With Technical Assistance From:

PROF. GARY SCHWARTZ - (UCLA School of Law) - Legal research
DON SOLEM AND ASSOCIATES - Survey research
PAT YOSHITSU - Cover design

ABAG Management

REVAN A. F. TRANTER - Executive Director
EUGENE Y. LEONG - Deputy Executive Director

Project Review Committee

ROD DIRIDON (Chairman) - Santa Clara County Supervisor
STANLEY SCOTT (Vice-Chair) - Member and former Chair; California Seismic
Safety Commission
ROBERT D. BROWN - Geologist; U.S. Geological Survey
HENRY J. DEGENKOLB - President; H.J. Degenkolb Associates, Engineers
PETER B. HAWES, EDWIN ROOKER - President, Claims Counsel; Design
Professionals Insurance Corporation
JOHN H. LARSON - Former Los Angeles County Counsel; Musick, Peeler, and
Garrett
BRUCE D. OLIVER - Assistant General Counsel; Kaiser Aluminum and Chemical
Corporation
H. ROGER PULLEY - Senior Planner; California Office of Emergency Services
ARVO VAN ALSTYNE - Professor of Law; University of Utah
CHARLES T. VAN DEUSEN, JAMES C. LOGSDON - Attorneys; Pacific Gas and
Electric Company

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INTRODUCTION

The survey of company officials and design professionals suggests that liability could be used more effectively to promote safety.* Almost all officials and professionals noted that there should be liability for earthquake hazards in certain situations. They indicated that they believed such liability was consistent with the moral obligations of companies and the legal concepts of "reasonableness" and "standard of care." They noted that liability should depend on the cost of mitigation, the size and foreseeability of the earthquake, and the standard of care established. No clear consensus exists for making companies or design professionals either more liable or more immune to promote safety. However, several POSSIBLE approaches for encouraging hazard reduction use liability indirectly, including the following.

1. Educational Approaches

- o Educating officials on liability rules would increase the effectiveness of those rules by promoting concern for the economic ramifications of failing to reduce hazards.
- o Education on hazards identification would improve the ability of officials to make the rational cost-benefit analysis essential to one basis for imposing negligence liability.

2. Legislative Approaches

- o Introducing legislation to clarify the weakness of an "act of God" defense (or even publicizing this weakness) would reduce the perceived uncertainty about current liability rules.
- o Changing the law to provide that a defendant's compliance with certain types of comprehensive governmental regulations would serve as a complete defense to a claim that the defendant was negligent relative to a matter directly dealt with by those regulations. Such a standard of care could be set for a general procedure, such as independent review, or introduced as part of particular statutes or regulations, such as might be developed for retrofitting existing buildings.

* See the background report, "The Impact of Tort Liability on the Willingness of Companies to Mitigate Earthquake Hazards," for more information.

3. Insurance Approaches

- o Insurance companies could encourage greater safety by keeping a rate structure that encourages high deductibles or partial self-insurance by ensuring that the first block of insurance is expensive.
- o Insurance companies could encourage hazard reduction by basing premiums on past performance, and by lowering premiums if companies reduce certain hazardous conditions.

Other approaches promoting earthquake safety have little or nothing to do with liability rules, including, for example, providing financial incentives to take remedial action in mitigating hazards.

These and other approaches were discussed at meetings of this project's technical Review Committee and at the conference held in San Francisco on April 13, 1984. The Committee, at its final meeting in June 1984, recommended the following approaches:

EDUCATION: The results of this study should be disseminated widely to alert the private sector to the potential for earthquake liability and the availability of hazard mitigation measures.

LEGISLATION: Legislation should be introduced at the State level to immunize design professionals, building owners, and developers from tort liability if they undertake rehabilitation of existing structures to life-safety standards established by local governments.

Each of the POSSIBLE approaches examined is described in turn in the following pages, together with the advantages and disadvantages of taking such action.

OPTION 1A: EDUCATION ON LIABILITY

Materials and other ways of educating people on the liability of private businesses and industries for earthquake hazards and losses could be prepared and disseminated.

The Issue

Education on liability was a key component of the April conference and will be one result of the project's publications. However, additional materials could be prepared. Specific publications or summaries could provide information on:

- o design professionals and contractors;
- o land and building owners;
- o insurers and lenders;
- o safety officers;
- o manufacturers;
- o retail operators; and
- o others.

Such information could focus on:

- o contractual disclaimers and hold harmless agreements;
- o reliance on technical code standards and inspections;
- o communication of hazards and liability to supervisors and clients; and
- o worker and public safety.

Materials could also be presented in other forms, including a slide show that could be checked out and used in company staff meetings and by professional and business organizations. This program, together with project reports, could allow for reaching large numbers of people with minimal effort.

The Advantages

There should be no major objection to educating company officials on their liability for earthquake hazards. Lack of information on liability was one of the problems identified in ABAG's original proposal to the National Science Foundation. Those company officials surveyed and interviewed, as well as those attending the April conference, strongly favored such education. Finally, education on liability should increase its effectiveness by promoting concern for the legal and economic, as well as the safety, ramifications of not reducing hazards.

The Disadvantages

One of the problems with the educational strategy is similar to those presented in the old saying, "you can lead a horse to water, but you can't make him drink." For example, in spite of the large stated interest in educational materials, a relatively small percentage of those sent information on the conference elected to attend (approximately 1.5%).

In addition, personal interaction and question or discussion sessions seem key to appropriate interpretation of the project's findings. Therefore, a slide show would be of marginal usefulness.

Finally, educational programs are expensive to organize and finance, especially over the long term.

The Project's Review Committee Recommendation

ABAG should focus on using the project's reports as educational tools, rather than in preparing any additional information. The "Executive Summary" is relatively inexpensive to distribute and was well received at the conference, seeming to answer most questions. Staff will also be available for giving presentations before interested groups. Finally, staff should make use of existing educational programs, such as those of FEMA and CALEEP, to distribute publications.

OPTION 1B: EDUCATION ON HAZARDS IDENTIFICATION AND MITIGATION

Materials and other ways of educating people on the identification and mitigation of earthquake hazards could be prepared and disseminated.

The Issue

Although ABAG, as part of this liability project, is not in the position to develop and disseminate extensive hazards information, other less ambitious courses of action are available.

(1) ABAG staff as part of the survey of experts, collected information on hazards that will be available to those company officials, researchers and hazards experts who read the background material.

(2) ABAG staff as part of the surveys and interviews of company officials and design professionals, collected extensive information on hazard mitigation programs that will be available to those reading the background material.

(3) A short description of sources of hazard identification information could be included in the "Guide to Liability" report.

(4) ABAG could support the efforts of other organizations and agencies to provide information on hazards identification keyed to the needs of company officials, as well as seek funding to provide such data itself.

The Advantages

Many of the company officials interviewed expressed an interest in and a need for additional information on identifying and mitigating hazards. In addition, hazards education should improve the ability of officials to make the rational cost-benefit analysis essential to one basis for imposing negligence liability.

The Disadvantages

As with the previous educational option, the key disadvantages to this approach are:

- o possible lack of public interest in making use of the data, and
- o expense.

The Project's Review Committee Recommendation

ABAG staff should implement the suggested measures.

OPTION 2A: THE ACT OF GOD DEFENSE

California law could be clarified to establish the following principle: "The occurrence of an earthquake is not an act of God that automatically relieves one of tort liability; rather, it is a factor that bears on the general tort-law doctrines of causation, foreseeability of risk, and feasibility of mitigation strategies."

The Issue

California's Civil Code, adopted in 1872, includes Sec. 3256 which states as follows: "No man is responsible for which no man can control." This provision incorporates California's version of the "act-of-God" doctrine, an idea that has long played some role in common-law tort opinions. In interpreting Sec. 3256 and the act-of-God doctrine, California courts seemingly have endorsed this principle. The leading case from the California Supreme Court is Chidester v. Consolidated Ditch Co., decided over a century ago. According to Chidester:

No one is responsible for that which is merely the act of God, or inevitable accident. But when human agency is combined with it, and neglect occurs in employment of such agency, a liability for damage results from such neglect. [The legal rule may be] explained as follows" It would be unreasonable that those things which are inevitable by the act of God, which no industry can avoid, nor policy prevent, should be construed to the prejudice of any [defendant].

In considering this version of an act-of-God doctrine, the Court described and commented on the instruction given to the jury by the trial judge in Chidester.

The Court, at the request of the plaintiff, gave further instruction: "Negligence is not simply in originating mischief, for this may be a lawful act, but in not controlling it when put in operation." By this language we understand the Court to have directed the jury that negligence is not simply originating that which may be the cause of mischief or injury, but that it consists also in failing to control this cause, so as to prevent it from inflicting injury. This, in our judgment, is the fair construction of the instruction, and in this view we cannot see that the defendant was prejudiced by its having been given. Whoever originated that which caused the injury, it became the duty of the defendant, from and after the time which it acquired the ditch, to use the proper means to prevent this cause from producing injury to another. The instruction was correct.

The Chidester opinion also made clear that the jury enjoys a wide discretion in resolving act-of-God and negligence controversies.

In a case where reasonable men might, upon deliberation, differ in their conclusions, it would be improper for this court to interfere with the verdict...Such a deduction from facts previously determined, must be based upon the experience and observation of the triers, the experience and observation of this

court not to be substituted for that of the jury.

Later case law in California--mainly at the intermediate court level--has been fully faithful to the standards announced in Chidester.

If these Chidester ideas can be applied in the earthquake situation, one can readily conclude that a jury can find a defendant negligent (and therefore liable) either for failing to reasonably plan for a foreseeable earthquake, for failing to reasonably manage its property during an earthquake, or for failing to reasonably control or reduce risks after an earthquake. Nevertheless, on its facts Chidester was a very easy case: the natural event in question was merely the melting of snow from nearby mountains, which caused a heavy flow of water. This flow of water was highly foreseeable: as the Court said, it is "periodical, and may be and is anticipated by all persons inhabiting the region where the alleged damage occurred." The subsequent California cases have likewise dealt with highly foreseeable natural events.

One is unable to find in California law any cases imposing tort liability on a defendant after a genuine natural disaster. In particular, there are no California cases imposing tort liability for harm occasioned by an earthquake. This last point can indeed be extended in a rather dramatic way: there are no cases anywhere in the United States--and perhaps anywhere in the world--that have imposed tort liability for earthquake-related harm. However, it is also true that there are very few cases denying such liability: tort suits relating to earthquake harm have been few and far between.

One of the very few cases is Slate v. South Carolina Ry., an old South Carolina opinion concerning the special liability of a common carrier. Under longstanding South Carolina law, a common carrier is strictly liable for all damage to the goods it is transporting, unless that damage is caused by "an act of God or the public enemies." While this common carrier rule expresses a strict liability principle, Slater's interpretation of an act-of-God exception introduces strong negligence notions. According to the Slater court,

if there be any negligence on the part of the carrier, which, if it had not been present, the injury would not have happened, notwithstanding the act of God, the carrier cannot escape liability. The onus is upon the carrier to show that not only the act of God was the cause, but that it was the entire cause; because it is only when the act of God is the entire cause that the carrier can be shielded.

To be sure, the Slater court, in shifting through that case's facts, was unable to find any evidence of railroad negligence and hence ruled the railroad not liable. Nevertheless, its basic reasoning is quite consistent with the option of clarifying the law being discussed.

This option presupposes a negligence standard, one that would call for a balancing of the cost of risk prevention against the magnitude of the foreseeable risk. The foreseeability of an earthquake depends, in turn, on the defendant's situation. Assume a motorist who merely takes a single trip on a highway located near an earthquake fault.

The risk of an earthquake during that trip is infinitesimal; as a result, it is inconceivable that the motorist could be found negligent for having taken that trip. Assume, however, a California landowner who is planning to erect a building that is expected to have a useful life of perhaps 100 years. An earthquake at some time during the 100 years hardly seems unforeseeable; therefore, negligence law would oblige the landowner to include reasonable precautions in his building's plan. These illustrations are set forth as extreme cases: any number of other situations would fall between them.

The Advantages

One can develop a very solid prediction that the California Supreme Court would, in an earthquake case, fully agree with the principle proposed: all the Court would need to do would be to apply Chidester standards to earthquake facts. Nevertheless, as the survey and interviews conducted as part of this project have apparently revealed, some potential defendants in California apparently believe that an act-of-God doctrine exists in the law that would relieve them of liability in earthquake circumstances. Many other potential defendants may well regard act-of-God as at least a possible defense--a factor that would render uncertain the results in victims' post-earthquake suits. The various beliefs of all these defendants might discourage them from adopting the safety measures that negligence law would otherwise urge. The chief advantage of legislative adoption of the principle here proposed is that it would avoid this discouragement and hence promote earthquake safety.

There is, moreover, a second advantage. Assume that an earthquake does occur--and results in a number of tort suits. If the prediction of this research is correct, the California Supreme Court would ultimately adopt the principle discussed here. The uncertainty as to the Court's ultimate position, however, would greatly complicate whatever tort actions might be brought. Legislative enactment of the recommended standard thus has the advantage of simplifying the litigation that would ensue in the wake of a damaging earthquake and of eliminating an obstacle that otherwise might temporarily block the award of compensation to worthy victims.

ABAG would be asking the Legislature to ratify what existing law seems to be--and state it in clear and simple terms--in circumstances where this ratification may produce advantageous results clarifying that liability will be imposed upon defendants for failing to take reasonable measures relative to the earthquake risk. Here, points advanced in the background report, "Private Sector Tort Liability, Safety Incentives, and Earthquake", becomes relevant. From a fairness perspective, it seems appropriate to impose liability on defendants who could have prevented harm at reasonable cost and who failed to do so. And from the perspective of safety, negligence liability, uninhibited by an artificial act-of-God defense, might provide appropriate incentives for defendants to adopt reasonable safety measures.

The Disadvantages

The deficiencies of negligence law in achieving safety need to be considered. The background report on the current California law observed, for example, that the "featureless generality" of the negligence standard reduces its effectiveness in providing safety incentives. That also suggested that people

(and businesses) may have a psychologically difficult time in thinking about the possibility of a catastrophic earthquake that is, on a day-to-day basis, an extremely low-probability event. These deficiencies would perservere even if the act-of-God defense were legislatively eliminated. Nevertheless, the present uncertainties pertaining to act-of-God may well help discourage some defendants from even thinking seriously about their potential tort liability. Legislative clarification of the act-of-God doctrine--and the publicity that would accompany that legislative action--thus might have desirable effects in inviting defendants to take a hard look at their earthquake precautions.

One should mention, in addition, an argument that might be advanced in opposition to the full application of negligence principles to earthquake-occasioned harm. In a negligence case, the foreseeability of an earthquake would be the crucial fact, and the determination of foreseeability would be rendered by a jury. This at least raises the possibility of excessive liabilities being imposed on defendants. It is often thought that juries resolve doubts in favor of innocent "little guys" in their tort actions against large corporate entities. Moreover, even though the jury may be instructed to consider the foreseeability issue in a before-the-fact way, an obvious point is that the earthquake has indeed occurred, and the jury is hence considering the earthquake's before-the-fact foreseeability from an after-the-fact perspective. All of this might encourage the jury improperly to overstate the earthquake's original foreseeability. As common wisdom goes, hindsight is 20-20. Indeed, recent experiments conducted by academic psychologists have provided clinical support for the idea that knowing what actually happened in fact is quite likely to distort people's judgment as to how likely it was to happen in the first place. If, therefore, the tort system were authorized to apply the negligence standard to earthquake-occasioned harms in a general way, that standard might be misapplied in a way that would be conducive to excessive liability. However, the prospect of such an overreaction by judge or jury is limited. After all, after a severe earthquake almost everyone would likely be extremely aware of safety measures they could have (but didn't) adopt for their own protection. One suspects, therefore, that most people would be willing humbly to consider in a fair-minded way a defendant's claim that his failure to adopt some particular precaution was not sufficiently unreasonable to justify imposing the penalty of tort liability.

A final argument against this approach is related to the advantage of the proposal in achieving greater certainty and in achieving a greater perception of liability. The background report based on the surveys and interviews of company officials concludes that there is no indication that either perceived uncertainty in the liability rules or perceived degree of liability have any relationship to the existence of exemplary earthquake preparedness in companies.

The Project's Review Committee Recommendation

Given the effort involved in making this legislative change and the uncertain benefits, the principle related to the act of God defense should be made a part of ABAG's educational work, rather than a legislative proposal.

OPTION 2B: A SPECIFIED "STANDARD OF CARE"

The law could be changed to provide that a defendant's compliance with ambitious governmental regulations serves as a complete defense to a claim that the defendant was negligent relative to a matter directly dealt with by those regulations.

The Issue

The general common-law position in California and elsewhere as to the effect of a defendant's compliance with regulations is dealt with in the background report on current California law, on pages 7-11. In this summary, this position is that designs meeting code standards are not automatically free of liability. The common-law position in this regard has very recently been reaffirmed by a decision by a California Court of Appeal on September 26, 1983. In Elsworth v. Beech Aircraft Corp., 147 Cal. App. 3d 384, 195 Cal. Rptr. 226 (1983) a wrongful death action was brought against an aircraft manufacturer alleging a design defect in the manufacturer's airplane. The airplane, however, had been certified as safe by the Federal Aviation Authority. According to the Court, this certification--expressing the FAA's view that the airplane complied with federal regulations--counted as no more than evidence in favor of the defendant on the issue of design defect. Quoting the Second Restatement, the Court indicated that "compliance with a statute or regulation is admissible as evidence of the actor's exercise of due care," but such compliance "does not prevent a finding of negligence where a reasonable man would take additional precautions." Citing the California Jurisprudence treatise, the Court reasoned that "it does not follow . . . merely because one has complied with the terms of a statute or regulation that he is thereby absolved of negligence. One may act in strict conformity with terms of the enactment and yet not exercise the amount of care which is required under the circumstances." In particular, the Court replied on the Oregon Supreme Court's opinion in Wilson v. Piper Aircraft Corp., which specifically held that FAA certification is not a complete defense to a charge of design defect.

As noted in that background report, however, the Oregon opinion in Wilson prompted a separate opinion from Justice Linde. In a corresponding way, the majority opinion in Elsworth elicited a separate opinion from Justice Kingsley. According to Justice Kingsley:

General safety regulations, by their very nature, set forth minimum standards but do not, and cannot, deal with every individual designed product. It follows that some designs, although complying with minimum safety regulations, may not, in fact, be free of design defects which have caused injury. But here, the certification was that the particular design model herein involved was "airworthy"--i.e. that it was, in fact, safe to fly.

Justice Kingsley argued that this certification, being comprehensive in character, should completely eliminate the plaintiff's claims that the plane should have had a safer design. Justice Linde, in his Wilson concurrence, had advanced the following points: First, while in some cases regulations are only "minimal" in character, in other cases the criteria for regulations are virtually "identical" to tort law's own standards of reasonable care (or defective design). Second, when this is so, it becomes "very problematic" to allow a "sequence" of lay juries to engage in the second-guessing of the

regulatory decision. According to Linde, a regulation should hence be binding on a tort court unless (1) the safety standards underlying the regulatory program are "less inclusive or demanding" than the criteria for tort liability rules, or (2) the regulatory agency "did not address the allegedly defective element of design or in some way fell short of its assigned task." In Justice Linde's view, the burden of proof on the first point should rest on the defendant: that is, it is the defendant's job to show that the criteria for the regulatory program are at least as "demanding" as the general criteria required in tort. On the second point, the burden of proof belongs to the plaintiff. That is, the plaintiff would need to show that he is asserting a claim of unreasonableness or defectiveness that the regulation in question does not really address, or that the regulatory agency had somehow clearly "fallen short."

This approach could be given effect in either of two ways. First, the California Legislature could pass a general statute incorporating the Linde proposal and rendering it generally applicable to tort actions in the state. Secondly, the California Legislature could add provisions to particular state regulatory programs establishing that compliance with that program's regulations serves as a defense against a tort claim. In reviewing individual regulatory programs, the Legislature could specifically consider whether the program's criteria are indeed as "inclusive" as those exhibited by the law of torts, and also whether given that program's operation there is any prospect of undue regulatory laxity.

The Advantages

One of the major drawbacks of tort liability standards is their "featureless generality." In ordinary circumstances, a party never knows in advance what it is he needs to do to comply with those standards. A regulation can provide the specificity that common law standards lack. The tort system would thus achieve a gain by attaching strong significance to a defendant's compliance with a pertinent regulation.

If a defendant violates a pertinent safety statute or ordinance, this violation is regarded by the common law as presumptively establishing the defendant's negligence. If there is a regulation that is "directly in point", there seems to be an unfair lack of symmetry in refusing to rule that a defendant's compliance with such a regulation at least presumptively establishes his freedom from negligence.

The traditional common law rule may be out of line with public assumptions about the relevance of regulatory compliance. For example, in recent years the City of Los Angeles has been enforcing its brush clearance regulation. Every year city officials inspect properties and instruct landowners as to what they must do; finally, a certificate of compliance is issued. If a fire should occur, the landowners would be shocked to learn that, despite their compliance with the city's program, they remain vulnerable to claims of negligence for not having undertaken additional clearance.

The integrity of the process of adopting regulations might be improved by allowing compliance with regulatory standards to serve as strong proof of a defendant's non-negligence. Business is likely to object to the regulation in an excessive way if the regulation's impact on civil liabilities is asymmetrical--if violation of the regulation establishes tort liability but

compliance does not eliminate liability; under these circumstances, business has everything to lose and almost nothing to gain if the regulation is issued. Business might hence oppose a proposed regulation with excessive vigor; a company's attitude toward the regulation might be more balanced if the tort implications of the regulation were likewise more balanced.

The Disadvantages

A major potential problem results from regulations frequently being political compromises. For example, since defendants are sometimes better organized than potential victims, they may be able to lobby effectively in order to water down proposed regulations. There hence is a political danger that individual regulations will end up being too lenient.

A second problem concerns Justice Linde's suggestion that the defense can be overcome if the plaintiff, by way of rebuttal, can show that the regulatory agency "in some way fell short of its assigned task." If this means that the plaintiff would be generally allowed to argue to the jury that a particular regulation is unduly lenient, then the plaintiff's exercise of the right to rebut would bring about exactly the kind of second-guessing of regulatory judgment that the Linde defense is supposedly designed to prevent. However, according to Linde (telephone communication, November, 1983), he would not allow a plaintiff to call into question the wisdom of a regulation. Rather, his language is intended to refer only to situations in which the agency's regulations are abused or misapplied by an agency officer in issuing some particular permit. Linde would hence rule out any challenge to the adequacy of building-code regulations on earthquake resistance--though he would permit a plaintiff to argue that a local Building and Safety Department ignored these regulations in issuing a specific building permit or certificate of occupancy.

The third, and perhaps the largest, problem relates to the current state of earthquake-related design. Such design can lead to the building of unsafe structures if the codes are viewed as prescriptive (cookbook), rather than as performance standards. Engineering judgment is needed. The liability system is more appropriately designed to encourage "reasonable" behavior.

The Project's Review Committee Recommendation

This principle of allowing a legislative enactment to set the standard of reasonable conduct should be used in only one specific regulatory program to test for its effectiveness. The program relates to the rehabilitation of existing hazardous buildings used for human occupancy to a life-safety standard. Previous legislation advocated by ABAG provides immunity to local governments for adopting, or not adopting, such standards. Proposed legislation should provide for immunity of the building owners and design professionals for complying with such ordinances. ABAG and the State Seismic Safety Commission will monitor this program to help ensure that unreasonably lax ordinances are not enacted.

OPTION 3: INSURANCE

- o Insurance premium rates could be structured to encourage high deductibles or partial self-insurance to encourage greater safety efforts.
- o Insurance premium rates could be structured to be based on past performance and could be lowered if those insured reduce certain hazardous conditions.

The Advantages

These two ideas for encouraging safety are supported by the legal research on the impact of liability insurance. The negligence liability system tolerates, and indeed can encourage, the purchasing of liability insurance. By relieving the injurer of the immediate burden of liability, liability insurance greatly weakens the deterrence consequences of the negligence liability rule. The background report, "Private-Sector Tort Liability, Safety Incentives and Earthquakes," discusses this issue.

[Assume a]...\$10,000 risk that can be eliminated by a \$7,000 safety expenditure. Assume further that [the] defendant has purchased (for whatever price) a full negligence liability insurance policy. While the \$7,000 cost of safety is less than the \$10,000 cost of liability, this is a liability cost which the defendant himself is no longer required to bear: it is borne instead by his liability insurer. The defendant is thus faced with a \$7,000 safety cost in comparison with a "net" liability cost of zero. Assuming that the defendant is merely self-interested, he will forego the safety expenditure and allow the accident to happen.

The extent to which insurance reduces the incentives that would operate in the absence of insurance is well recognized in the economic literature; it is referred to as the problem of "moral hazard." For safety purposes, there is no full, general solution to the moral hazard problem. There are, however, partial solutions.

- a. ... the greater the incidence of self-insurance, the more effective negligence law will be in inducing safety. The larger the defendant's enterprise, the more likely it is to self-insure.
- b. ...the higher the deductible in whatever insurance policies are written, the ...[more] those policies will ...[increase] the safety incentives of the negligence liability rule.
- c. ...the more that insurance policies include experience rating, the ...[more] they ...[add to] the safety incentives of negligence liability.

d. ...the more feasible it is for an insurer to detect negligence in advance by inspecting the insured's premises, the ...[more] the eventual insurance policy ...[encourages the insured] to ignore the safety goals of negligence liability. The larger the insured's premium, the more economically feasible it is for the insurer to conduct an inspection.

The on-site interviews with various industry and business representatives revealed that the insurance industry can play a significant role in the mitigation of earthquake hazards by private sector businesses and industries. This role is supported by the surveys of company officials; those companies with self-insurance for tort liability or with formal risk-management programs tended to have more comprehensive earthquake preparedness programs than average.

The Disadvantages

The proposals may be extremely difficult to implement. However, to some extent, insurance premiums are handled in these ways at the present time, not to encourage safety, but to save the money of the insured. The effect, though, is to encourage greater safety efforts.

In most cases, there is an initial loss control inspection at commencement of the policy. However, the usual practice at this time is not to have continuing inspections of the insured's premises. The industry also can threaten to reduce coverage for an insured's failure to follow recommended safety procedures with regard to earthquake hazards. However, such actions apparently are rare.

The financial savings accruing from premium structures designed to provide incentives for increased deductibles or for mitigating earthquake hazards are so small and the costs of implementing the hazard mitigation steps so high that it is unlikely that they would encourage hazard mitigation.

The insurance company officials were much more enthusiastic about educational and legislative approaches to reducing earthquake hazards.

The Project's Review Committee Recommendation

The Committee recommended against trying to implement these insurance options. Of course, current insurance practices, which serve to encourage safety to some extent, will remain.

