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Practical Forensic Engineering -- Property -- Part I[©]

Dana F. Shave, P. E.



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Course Description: This course provides a basic familiarity with the essentials of forensic engineering for property losses, as applied to basic principles and to the investigation, assessment, and reporting of property damage claims for insurance industry and attorney clients. Practical guidance is provided such that the practicing forensic engineer may be better able to assess and understand the environment in which he is operating, and to be aware of the expectations and of the challenges placed on him in this role. Emphasis is placed on the implementation of a scientific and thorough process for investigation, reporting and forming opinions that minimize opportunities for later challenge, either by another technical practitioner or third party, and/or during litigation. The elements of the litigation process, including expert testimony, are reviewed as they may apply to the engineering expert witness.

1. INTRODUCTION

Forensic Engineering as a specialty as applied to the property and casualty insurance industry has developed rapidly over the past 20 to 30 years – gaining momentum, particularly post-catastrophic (CAT) weather events such as Hurricanes Andrew and Katrina, and more recently with SuperStorm Sandy. The insured losses were estimated¹ in 2015 as:

<u>Hurricane</u>	<u>Date</u>	<u>Insured Losses, \$B</u> <u>(Original Values)</u>	<u>Fatalities</u>
Katrina	2005	\$ 62.5	1,322
Sandy	2012	\$ 29.5	210
Ike	2008	\$ 18.5	170
Andrew	1992	\$ 17.0	62
Ivan	2004	\$ 13.8	120

These are the largest insured disaster losses in recent years. In what used to be a highly specialized field, there are now thousands of engineers practicing forensic engineering across multiple engineering disciplines; specialized courses and forensic engineering majors are appearing in the university system. Other industry drivers are increased litigation involving the need for engineering experts – on both sides of the case - and increased regulation of insurers by state regulatory bodies.

Webster-Merriam defines the noun *forensic* as:

1. an argumentative exercise;
2. the art or study of argumentative discourse;
3. the application of scientific knowledge to legal problems; especially: scientific analysis of physical evidence (as from a crime scene).

¹ Munich RE (Münchener Rückversicherungs-Gesellschaft, Geo Risks Research, NatCatSERVICE)



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Although we traditionally may have associated the word *forensic* with a medical or criminal investigation, it commonly includes the application of scientific and technical methods to other issues that have, or may have, legal consequences, generally issues associated with some form of litigation. I emphasize the scientific and technical methods as this approach becomes extremely important if you are called to testify at trial. The application of scientific and technical methods by an expert is formalized in law and has specific consequences for the practicing forensic engineer expert as we shall see in a later section of this document. Forensic investigation is applied across a variety of engineering fields and to various events that are not necessarily property losses. These include fire investigation, accident reconstruction, product liability (often associated with personal injury), accounting, slip-and-fall events, and a host of other situations. Not all of these areas are considered as forensic engineering -- fire investigation and accident reconstruction cases are often handled by specially trained, experienced and certified practitioners who are not necessarily degreed or professional engineers.

Forensic engineering for property primarily involves the determination of the *origin*, *cause*, and *time frame* of an event that has caused some form of property damage. Routine property-related events are often relatively minor (water losses, construction defects, tree or vehicle hits house, etc.), carrying low loss reserves. Large loss reserves, especially commercial losses, can run into hundreds of thousands or millions of dollars. In some cases, the event or the collateral damage from the event has caused personal injury. When personal injury becomes involved, things can change rapidly. Potential high-dollar liabilities to an individual or to an insurer increase the need for, and utilization of, forensic engineering experts. Insurers generally treat high-reserve claims as large-loss events, and assign specialized adjusters experienced in dealing with these more complex cases.

Typical Property Cases

The typical property case may involve one or more of the following actions of or by a forensic engineer:

- Inspection of real property;
- Interviewing of involved parties;
- Review of documents — reports, estimates, photographs, correspondence, etc.;
- Determination of the origin and cause of an event;
- Determination of the time frame of an event;
- Assessment of construction defects;
- Determination of the continued viability of a structure, post-event;
- Preparation of a scope of repair and/or protocols for repair;



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- Preparation of an estimate of repair;
- Research of product history;
- Testing of products;
- Participation in joint inspections and testing with other engineers;
- Presentation of a verbal report;
- Preparation of a written report;
- Determination of the potential for subrogation;
- Critique of an engineering report authored by others
- Rebuttal to a review of a report prepared by the forensic engineer.



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2. ORIGIN, CAUSE, AND TIME FRAME

The *origin* of the event is the source, location, or the specific item involved in or with the event. This may be a residential or commercial piping system, an overloaded or defective roof structure, a settled or cracked foundation, an overflowing washing machine, or a leaking dishwasher, or failure to operate (e.g., a sprinkler system), among many possible events.

ROOT CAUSE

A **root cause** is an initiating cause of a causal chain that leads to an outcome or effect of interest. Commonly, root cause is used to describe the depth in the causal chain where an intervention could reasonably be implemented to change performance and prevent an undesirable outcome.

secondary, cause. All potential causes should be considered.

The role of the forensic engineer is to thoroughly investigate the circumstances of the event to the extent necessary to form a technical or scientific opinion as to its origin and cause. He must present this opinion appropriately such that his client can make a coverage decision and/or take other actions, including litigation, as necessary. The investigation usually involves an on-site investigation, and may involve on-site, shop, or laboratory testing as necessary and appropriate, and potentially the introduction of a specific component or item into evidence. Items are formally taken into evidence by the forensic engineer, establishing an item-specific chain-of-custody, and following established protocols for the handing and storage of such evidence. The evidence has follow-on value for further off-site testing and

The *cause(s)* of the event is the specific action, condition or reason as to why the event happened. A pipe can fail from freezing as a result of a failure to insulate, a pressure reduction valve may fail to function due to wear and tear on a domestic or commercial water supply system, piping may leak due to the freezing or corrosion, due to defective materials, or to a host of other issues. There may be multiple causes of a particular event, and we therefore often need to isolate the root or primary cause from the casual, or

CASE STUDY *Cause and Origin*



Cause and Origin: this is one of two 90-ft diameter grain storage silos out of four at the same site. The steel roof on each failed suddenly inward. There was weather in the vicinity. Was this weather, a construction defect, or could it have been something else?



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evaluation (generally with other parties present), or to demonstrate the issue at hand to a third party or parties, including introduction of the evidence at trial.

In addition to the origin and cause, the forensic engineer is often asked to provide an opinion on

CASE STUDY
Root Cause



A flat, trussed roof partially failed after a heavy rainstorm. The root cause of the failure was long-term termite infestation, and a secondary cause was the weight of ponded water on the roof.

the time frame in which the event occurred. The simple reason for this is that common forms of residential insurance policies often exclude or limit coverage for events that are not “sudden and accidental”. The client, if an insurance adjuster, has to make a coverage decision, and may rely in large part on the time frame opinion presented by the forensic engineer.

It is vital for the forensic engineer to provide the rationale upon which each of his opinions is based – the technical and scientific basis that was used to form the opinion. He is expected to demonstrate these bases both in writing and through the use of photography hopefully such that both technical and non-technical recipients of the information can understand the opinions.

Often, the assignment will involve a review of documentation only. For example, a client may have received a notice of subrogation from another

insurer or from a lawyer. The client may ask simply that the forensic engineer review supplied documentation relating to an event and provide an opinion as to whether there may be culpability on behalf of the client’s insured party. This can put you in the position of reviewing a report prepared by another engineer or investigator, or simply an adjusters report with photographs. In other cases, the client will forward to you a piece of hardware to see if you think there may be a manufacturing defect or some other basis upon which they may be able to initiate subrogation.

The client wants guidance as to how to handle the case – simply deny responsibility, call for further investigation, or turn it over to their legal



UNDERSTAND YOUR SCOPE

Find out what is wanted and needed. Be clear on this and provide responses that provide value to and fulfill the specific needs of your client...



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department. At this point in time they may not want a written report. Your role is to provide your client with your best opinion of where they stand. They want to know the good and the bad – if their client appears to have little responsibility for the event, from their perspective that is good; however, if there appear to be significant liability issues related to their insured's actions, your client needs to know this now. This is not a place where you want to try to be the good guy or sugar-coat your opinions – the last thing your client wants is to engage in defending the undefendable, and they don't need platitudes at this point in time. Your opinions will also have value in identifying potential issues of the case that may assist to mitigate the liabilities, and therefore provide the client valuable assistance in handling the case at its early stages.



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3. PROFESSIONAL REGISTRATION

Most insurance and legal clients insist or very strongly desire that the forensic engineer involved with their case be registered as a Professional Engineer in the state in which the event occurred. Most often, the client needs the opinion of an independent professional in the appropriate field as a basis to fulfill their obligation to fully investigate a claim, a good-faith responsibility that is most often placed on the insurance industry by state regulators. However, they also are aware that the case likely involves the practice of engineering in the state, and (with some exceptions) only individuals registered as Professional Engineers in the state are legally able to perform those investigations. Holding professional registration also significantly reduces the chances that your testimony will not be disallowed at trial as a result of a legal challenge involving a lack of professional registration.

Remember also that if you are not licensed in a particular state and choose to accept an assignment involving the practice of engineering in that state, you are possibly in violation of state law and also risk discipline by the state Board of Registration of Professional Engineers. Disciplinary actions of this nature are something that I can assure you will not help your career as a professional engineer.

NCEES

The National Council of Examiners for Engineering and Surveying® provides a central records program that can greatly simplify the efforts and paperwork for those P.E.'s that wish to seek registration in multiple states.

Practice Within Your Field

Most states impose upon the Professional Engineer the requirement that the engineer may not practice outside of those technical areas in which he is qualified by virtue of his education, training and experience. They also leave the decision as to whether the engineer is qualified up to the engineer – in other words, you must be able to defend your qualifications to undertake a particular assignment. It has been the case that an engineer becomes involved in something for which he is not qualified, and his action is in error or otherwise leads to further investigation or litigation. The engineer can then be reasonably assured of an appearance before his licensing board resulting in possible sanctions, including suspension, loss of license and/or fines.

Ethics and Conduct

While it is true that you may be retained by a party that is squarely on one side or another of a particular case, you also have the formal obligation imposed by your state board of registration of professional engineers to abide by certain ethical standards and by their own regulations of



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professional conduct. While we do remember who is paying the bill, we do not lose sight of our independent, objective status and we do not sway our opinions, misrepresent or distort conditions, provide misleading statements, nor fabricate misdirection in our work. Be aware of anyone who wants you to change the wording of your opinions or of your report. Never allow changes to your opinions that you are not fully in agreement with and will be able to fully defend.

NSPE

The National Society of Professional Engineers® (NSPE) provides a Code of Ethics for Engineers covering Fundamental Canons, Rules of Practice, and Professional Obligations. This Code is available online and is very well worth reading if you have not done so.

Each individual state licensing board generally incorporates these or similar ethics and rules of practice requirements into their rules and regulations, as enabled by legislation. As a Licensed Professional Engineer in a state, you will be familiar with these. These rules do vary state-by-state but are remarkably similar. These rules are not to be taken lightly and state boards will move to discipline engineers who violate them.

Signing and Sealing Your Work

State board of registration language regarding which documents require sealing varies from state-to-state. The forensic engineer generally prepares a formal report of his work, and in many states this report is explicitly required to be signed and sealed in accord with the rules of that board. In other states it is not so clear. Be certain that if your state requires signing and sealing of your reports that you do so. Remember that your reports are subject to challenge, and any good opposing lawyer will come up with a motion to disqualify your report if it is not prepared in accord with the rules of the state board of registration. If the motion is successful and your report is deemed inadmissible for this reason, it is very possible that you have just lost the client's case. The smart opposing lawyer may have saved the motion for close to the time of trial, and there may no longer be sufficient time for your client to bring in an alternative expert. If you have reservations about signing and sealing your work, you probably don't want to be in this business.

INSURANCE COVERAGE



As a professional engineer assessing a property case for an insurance company, you are a neutral party. You should not worry about whether the loss is covered, and you should not make statements to the insured about coverage. Best advice: *call 'em as you see 'em.*



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4. SUBROGATION

SUBROGATION

Subrogation is the right of the insurer to collect monetary damages from a third party that may be at fault for an insurance loss. One of the reasons that a forensic engineer may be hired is to determine if there is a potential for subrogation to be pursued.

Subrogation is a legal term providing for the substitution of one party by another with regard to a debt or legal obligation. In the insurance form, subrogation allows the insurer to assume the rights of the insured to act against a third party, seeking financial recovery from a party that may have had some or all of the responsibility for the event. The recovery sought is for sums paid to the insured and for expenses incurred as a result of a claim.

The forensic engineer is often asked to determine if, as part of his investigation and in his opinion, there is a basis for subrogation associated with the claim. A basis for subrogation may be any act or condition that can be assigned to a third party that is either the cause, or part of a cause, for the occurrence of the event.

For example, a forensic engineer is assigned to investigate a water loss where a washing machine overflowed during use, resulting in significant damage to a residential property. The washing machine has not been touched or moved at the time of your arrival on site. Interviewing the insured, who was away at the time of the event, results in the fact that water was observed overflowing from the top of the machine when the insured returned home. After a visual inspection and photography of the machine in place, you decide that the problem most likely involves the water inlet valve. Your course of action is to take the machine into evidence so that you can test the machine in your shop as a complete system, in the condition in which it overflowed. The testing confirms that water flows through the hot water inlet valve without power being applied to the machine, indicating that the valve did not close as it should have upon signal from the machine. This indicates a strong possibility of a defective inlet valve and would be a

CASE STUDY Metallurgy



A close photo of a failed valve body. This valve was sent to a metallurgist for materials analysis. Energy-dispersive X-ray spectroscopy (EDS), shown below, determined that the failure was the result of dezincification. This is a manufacturing defect.





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basis for subrogation, should the insurer so choose. However, there are other potential causes that need to be investigated and rejected before a formal opinion can be offered.

When is Subrogation Warranted?

Subrogation is warranted if the forensic investigation uncovers the distinct possibility of a *manufacturing* defect, a *design* defect, an *installation* defect, or a *construction* defect. Bear in mind that establishing a basis for subrogation does not mean that there actually is a defect, only a strong probability of such. The actual defect must ultimately be identified and demonstrated in

CASE STUDY
Subrogation



This is a dishwasher inlet valve being tested under water pressure only, no power applied. Water leaks past the seat, and this is likely due to a manufacturing defect. The valve should be opened and inspected to demonstrate the defect, but that would be a destructive test and should wait for a joint inspection.

order for the subrogation process to succeed. At the early stage, an insurer or a lawyer acting on behalf of an insurer, may simply notify one or more third parties that their action or product may be associated with the loss. This generally provides the third party the opportunity to inspect and test (usually done jointly with others) the component. The liability insurer of the third party normally becomes involved at this point as well.

Bear in mind that the forensic engineer may be on either side of the issue. Engineers involved predominantly with property work are generally on the plaintiff side as they are normally first on the scene. However, if your client has been put on notice of subrogation, or is a lawyer, you may find yourself on the defendant side of the case.

If the defect is obvious, the responsible party or his insurer may accept it and pay the damages to the party that initiated the subrogation. If it is not certain, or if the third party feels there is no defect, that party will likely deny responsibility and legal action by the insurer may

follow. During the ensuing legal action, the forensic engineer will most likely be obliged to prepare a formal written report containing his opinion(s) as to why a defect is present and will have to defend his opinion(s) against other engineer experts who will likely disagree. Such defense will be made by formal testimony at deposition and at trial. The opposing party will have their expert who will not surprisingly have the belief that there is no defect, and the ensuing events often become an interesting engineer-vs-engineer situation.



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Types of Defects

A manufacturing defect involves the failure of a component part, or of a device, due to a defect associated with the original manufacturer of the machine or component. The failure can be a simple failure to operate or can be a structural failure such as a crack formation in a component part. Often there is a suspected materials defect in the component. In this case, the offending part is normally sent to a metallurgist, who will inspect it and test for various issues, usually identifying the composition of the material via mass spectrometry or other materials testing procedures. The metallurgist can also determine the types of fractures and their causes based on microscopic inspection. Detailed crack propagation assessment is not something that the average forensic engineer should attempt. Do not hesitate to seek a metallurgical opinion. A manufacturing defect can also be a design defect, as the manufacturer is generally responsible for the design of the item as well. A design defect may simply be the presence of a stress concentration in the part that has become the root cause of the failure. Demonstrating this may require specialty analysis or testing, including the possibility of finite element analysis.

An installation defect is simply improper installation of the component of device by the installer, who is generally a plumber, an electrician, an appliance installer for a department store, or other similar party. The most common plumbing failures are improper tightening of compression fittings in the water supply systems to appliances, improper handling of fixtures, and installation of incorrect parts. The large home and department stores generally subcontract delivery and installation of appliances; in my experience many water loss events seem to be associated with this practice.

A construction defect is improper construction or workmanship, generally by the general contractor or one of his subcontractors, with either water intrusion or structural failure most often resulting. In the instance of a construction defect the forensic engineer must be able to clearly demonstrate the defect. In most cases, a failure to meet the applicable building code is sufficient for demonstration. Therefore, you need a working knowledge of the building codes of recent years, such that you can identify the specific

CASE STUDY ***Construction Defect***



This shower valve cartridge was forced out of the body of the valve by freezing. This occurred because the contractor left the area unheated during freezing weather and this is therefore a construction defect.



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applicable building code, and the specific section of the code that has been violated. You should possess a set of very good photographs showing the defective construction, as the defect is not generally removable or able to be taken into evidence.

One other thing to bear in mind is that most states have laws (Statutes of Limitation or Statutes of Repose) that prohibit bringing a lawsuit against a manufacturer or contractor after a certain period of time. These time frames vary state-to-state. You ought to be familiar with these in the state(s) in which you practice and discuss the time frame with your client if the case may be near or beyond the appropriate statute. This is also a good time to point out that during your investigation you must obtain the date of manufacture or date of installation of the component, and the names of the installing or contracting parties. This information is available by using the manufacturer's nameplate information, by researching the building inspection department or property tax assessor records, or by interviewing the insured and obtaining copies of invoices, receipts and contracts if possible.



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5. TESTIMONY

Should the forensic engineer become involved with litigation, the process may get complicated. You will normally be working with an attorney retained by your client, and you will either be on the plaintiff or the defendant side of the case. Once the insurer turns the case over to the attorney, the attorney normally leads the case, and will not want you to discuss the case with others. The attorney will likely choose the proper time for you to produce an engineering report containing your opinions in the case – this report may not be produced until very late in the process, depending upon the case. The potential delay in preparation of a report makes good note taking, good research, and exceptionally good photography very important to the forensic engineer.

In litigation your case file (all notes, sketches, memos, emails, photographs and research) is discoverable by the opposing party, and you will most likely be subpoenaed to produce copies of these items. Professionally and legally, you must do so, and you should not dispose of any materials accumulated in your file. Correspondence and notes of discussion with the attorney, and (typically) your draft reports are not necessarily discoverable by the opposing party and these are best kept in a separate file.

Arbitration

Many smaller property cases end up in a binding insurance arbitration process (insurer vs. insurer) rather than proceeding to litigation. You may be called to testify to the arbitrator, and there most likely will not be a lawyer involved. Time factors in the arbitration proceeding are very short and you will simply present your opinions and the bases for them. The arbitrator may ask a few questions, but he has already seen your report and there is no formal cross-examination. You are expected to present your case clearly and convince the arbitrator that your opinion and the rationale for it, is correct.

Deposition

At some point in the legal process, after your involvement in the case has been formalized (you have been identified as an expert for the plaintiff or for the defense) by the attorney, and generally after your formal report has been issued, you will likely be deposed by an opposing attorney. Yes, there may be more than one deposing attorney involved if this is multiple party litigation. Deposition is a formal legal process, and your testimony will be taken under oath. A court reporter will record your verbal testimony and possibly a video will be made of your testimony as well. The deposition usually takes place in an attorney's office, and you should



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expect the attorney that you are working with to prepare you prior to the deposition regarding expected questions and your proper courses of action.

The opposing attorney will ask at length about your education, training and experience, more often than not going over your curriculum vitae and asking detailed questions about your degrees, professional licensing, previous testimony, and specific cases that you have been involved in. He will generally be (or start off) very kind and courteous, but you need to be aware that he is looking for weaknesses in your background. He will try to exploit these later, possibly to attempt to show that you are unqualified to provide expert testimony to the court for this particular case. He will then proceed to review in detail your notes, reports, and any other documentation that has been provided, either as part of court filings or through his discovery efforts. He wants to identify, if possible, where you may not have done your research or homework, and what specifics you based your formal opinions on. He may try to trap you into giving incorrect, incomplete or conflicting answers and he may try to put words or opinions into your mouth and get you to agree to those words or opinions. If you do, he will be able to cite your deposition testimony as in conflict with your reports or other testimony and attempt to negate or weaken the effect of your later (trial) testimony.

The best advice when in deposition is rather bland:

Be highly professional;

Listen to each question carefully and take your time preparing a response;

AnsWER only the questions asked, do not elaborate on them;

Never lose your cool or engage in argument;

Do not volunteer anything.

DEPOSITION 

A deposition is sworn testimony provided outside of the courtroom. You will be challenged by the opposing lawyer in order to find your weaknesses, both personal and technical. Be prepared and beware.

At the deposition, you will be offered copies to review of any document that the attorney refers to when he asks a question. These documents are all identified numerically as exhibits. Accept them and read them carefully before responding to questions about them. If you do not know the answer, state so and ask for time to review the materials you have been presented if that may allow you to answer the question. You may be presented with documents that you have not seen before. Do not guess, and do not fabricate responses because you feel that you have to. Above all, state only the truth, do not try to mislead the questioner. Avoid hearsay; if you didn't witness something or review a document personally, then you do not have firsthand knowledge of it.



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Depositions can be very lengthy, difficult and can get confrontational. The attorney that you are working with will be present and he will step in if necessary. You may hear a lot of objections from him – if he objects to a question, do not answer until he tells you it is OK to answer. Many objections are for the record and are not for you to worry about.

Trial in Federal Court

In civil cases tried in a Federal Court, the expert witness is primarily governed by the **Federal Rules of Evidence (FRE)**, and by the **Federal Rules of Civil Procedure (FRCP)**. Within FRE rules, you, as the expert witness, should be particularly aware of the following rules:

Rule 601. Competency to Testify in General

Every person is competent to be a witness unless these rules provide otherwise. But in a civil case, state law governs the witness's competency regarding a claim or defense for which state law supplies the rule of decision.

Rule 602. Need for Personal Knowledge

A witness may not testify to a matter unless evidence is introduced sufficient to support a finding that the witness has personal knowledge of the matter. Evidence to prove personal knowledge may, but need not, consist of the witness' own testimony. This rule is subject to the provisions of Rule 703, relating to opinion testimony by expert witnesses.

Rule 702. Testimony by Expert Witnesses

A witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or otherwise if:

- (a) the expert's scientific, technical or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact at issue;
- (b) the testimony is based upon sufficient facts or data;
- (c) the testimony is the product of reliable principles and methods; and
- (d) the expert has reliably applied the principles and methods to the facts of the case.

Rule 703 Bases of an Expert's Opinion Testimony

An expert may base an opinion on facts or data in the case that the expert has been made aware of or personally observed. If experts in the particular field would reasonably rely on those kind of facts or data in forming an opinion on the subject, they need not be admissible for the opinion to be admitted. But if the facts or data would otherwise be inadmissible, the proponent of the opinion may disclose them to the jury if their probative value in helping the jury evaluate the opinion substantially outweighs their prejudicial effect.



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The Daubert Standard

Rule 702 is informally known as the Daubert standard and was confirmed by the U. S. Supreme Court in Daubert, et al. v. Merrell Dow Pharmaceuticals, Inc. 509 U.S. 579 (1993) as applicable to cases in federal court, as opposed to the Frye standard. The Frye standard essentially states that expert opinion based on scientific techniques is admissible only when it is generally accepted in the relevant scientific community. This rule results from Frye vs. United States 293 F.1013 (DC Cir. 1923). In Daubert, the court held that the Frye standard was not sufficiently flexible, and specifically recognized the trial judge as the “gatekeeper” with respect to the admissibility of expert opinion. The actions of a judge with respect to the specific items within Rule 702 were further clarified in the Kunmo case (Kumho Tire Co. v. Carmichael, 526 U.S. 137 (1999)).

A synopsis of the Daubert opinion is found in Attachment B. You should also read the entire opinion of Daubert, as well as the synopsis of both Frye and Kunmo to better understand the hurdles that you may have to meet before your testimony is allowed.

Within the FRCP rules, you should particularly be aware of:

Rule 26 (a)(2)(B) requires the expert to prepare a signed, written report. The report must contain:

- a complete statement of all opinions to be expressed and the basis and reasons therefore;
- the data or other information considered by the witness in forming the opinions;
- any exhibits to be used as a summary of or support for the opinions;
- the qualifications of the witness, including a list of all publications authored by the witness within the preceding ten years;
- the compensation to be paid for the study and testimony; and
- a listing of other cases in which the witness has testified as an expert at trial or by deposition within the preceding four years.

RULE 26(A)(2)(B)



This Federal Rule of Civil Procedure requires that you provide the basis for your opinions within the expert report. Be clear and complete in expressing how you formed your opinions.



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Rule 26(b)(1) states that the opposing party may obtain under discovery any non-privileged material that you have regarding the matter at hand.

Rule 26 (b)(4)(c) states that the party seeking discovery shall pay the expert a reasonable fee for time spent in responding to discovery.

Rule 26 (e)(1) states that if any information already disclosed, either in the expert's report or at his deposition, is incomplete or incorrect the incorrect or incomplete information must be corrected.

The complete Rule 26 of the Federal Rules of Civil Procedure is found in Attachment A, highlighted for your review. If you anticipate testimony, this is good background with which you should be familiar.

Federal Court vs. State Court

State Courts have their own set of rules of evidence and civil procedure, and you will find differences from state to state. However, in general, the state rules mirror or reflect the federal rules. With respect to Daubert, the majority of states have adopted Daubert or deemed it consistent with their rules, but a number of states have either not adopted Daubert or have not made a commitment. These states either use Frye or another standard.

Essentially, the state rules of evidence and procedure govern your acceptability to the state court as an expert, the preparation of your technical material and reports, and the acceptable standards to which your testimony may be held. In the preparation of your reports, bear in mind the potential end uses of the report and construct the report carefully to minimize the effect of potential challenges by opposing lawyers and/or engineers.

Challenges to Your Expert Testimony

On occasion, your intent to serve as an expert witness may be challenged by an opposing party. In Federal court, the challenge will most likely be made under Rule 702, Daubert. The opposing party will make a motion stating the specific reasons why you should not be allowed to testify. Your party's attorney will file a rebuttal stating the reasons why you should be allowed to testify. The judge will call a





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hearing on the subject and will then decide your fate with respect to this particular case. The Daubert challenge, if made, will usually happen before the trial begins.

A Daubert challenge is not the end of the world, but is not welcome to the expert, as it may be considered a black mark on your credentials if you fail the challenge. Lawyers or clients in other later cases may be more reluctant to name you as their expert if you have previously failed a Daubert challenge in another court. The specific caution for the forensic engineer is not to take cases that you are not qualified to undertake.

The real issue for your client is that if your testimony is important to the case, the inability to present that testimony may be fatal to the case. There may not be enough time to bring in another expert and he will not have had the same opportunity as you had to participate in the development of the case and assessment of the evidence. It is this reason that your admissibility as an expert is so important and why you should prepare your opinions and materials very carefully, as the case proceeds, to prevent such a challenge if possible.



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6. IMPORTANT ELEMENTS WHEN INVESTIGATING A CASE

First, and above all, make sure you are a proper person to take on the case; be clear on what you are asked to do and make certain you are comfortable doing it.

The Investigation Process is Scientific

A well thought-out, deliberate, and organized approach is vital to your investigation. Although most property cases are relatively small in size, you should apply the same complete and consistent approach to each case, regardless of magnitude. The insurance carriers think in terms of loss size – small and large. This does not mean that you need to expend as many hours on a small loss as for a large loss, it just means that you have to be certain to develop correct, appropriate well thought out and defensible opinions with appropriate effort and within reasonable cost. If you rush, if you become overly focused, if you pre-judge the cause, or if you do a fly-by site visit, it will most likely come back at you later.

If you follow a definitive approach you will be in a much better position later to outline to the court the “scientific” approach you used as part of your qualifications as an expert to testify as to your opinions. Recall the essence of the Scientific Method as found in the Oxford Dictionary (see sidebar).

THE SCIENTIFIC APPROACH

A method of procedure that has characterized natural science since the 17th century, consisting in systematic observation, measurement and experiment, and the formulation, testing and modification of hypotheses.

Preparation

Think before you go. When you receive and accept an assignment, and you know the basic issue at hand, do your homework – before you perform the site inspection. First, if you have not discussed the case with the adjuster or client, do so; he may have specific requests, or he may have seen something that he is especially concerned about at the insured risk. If a residential or commercial structure is involved, map it on Google Maps or another similar site. Look at the Google Street View and at the aerial photographs. A screen shot of the insured risk at an earlier date can be incredibly useful in forming or later demonstrating your opinion. Use the photographs to determine the need, for example, for a ladder or any special equipment that you think you will need on site. If the insured risk has a high or difficult roof, you may want to request a ladder assist via the client.

If the local city or county has a GIS mapping or Assessors site, go to it and gather the basic information on the insured risk – date of construction, size, type of construction, etc. On some of



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the better sites, there are mapping applications that show the contours of the lot and the outline of the structures on site. Google Earth has about 20 years of historical aerial photos that can show you, for example the condition of a roof over past years. You can also determine the dimensions of the structure or location of site features from the aerial view. Google Street View may show you that the insured risk was in a certain condition on a certain date prior to the date of loss – and may demonstrate that the loss as claimed to be caused by a certain event was preexisting to the event. This happens more often that you might imagine.

Contact the insured or the claimant and ask for background. What happened, when did it happen, was the event observed as it happened, when did you notice the damage, did you take photos, etc., all this information looking for developmental background leading up to the loss. If a mechanical water loss, if possible obtain the appliance manufacturer, model and serial number, and date of installation if such an appliance is involved; if this information is available, research the appliance and obtain the user or service manuals, exploded parts drawings and part numbers if possible. Go to the Consumer Product Safety Commission (CPSC) website or Google the product to determine if there are previous reported issues with the item.

If weather is involved, obtain the best weather history for the date of loss (and days surrounding the DOL) as possible – WeatherUnderground is good for this but there are other sites, including National Oceanic and Atmospheric Administration (NOAA) and especially the NOAA/NWS Storm Prediction Center, which has historical reports of severe weather easily available. Try to use an official National Weather Service stations if possible. Later you may wish to compare the reported date with the damage with respect to hail, wind velocities and directions, and precipitation levels. In the event that you encounter a large or difficult loss, you may obtain site-specific meteorological reports at reasonable cost from a number of sources.

It does not take long to gather this data, and you will find it very useful.

CASE STUDY *Resources*



This county website has a nice tool for mapping that can be used to determine the roof or footprint area of the structure of interest.



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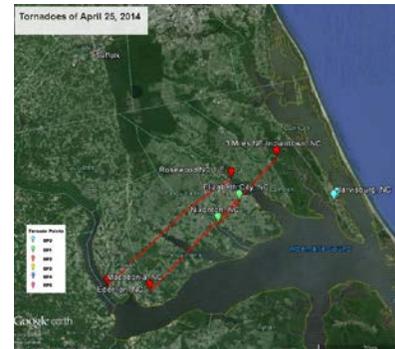
The Site Inspection

Set a specific date and time with the insured and try to accommodate their schedule. Plan on a one-hour minimum on site and advise the insured or claimant of such. It is not recommended to go to the site without someone present, as you take the risk of injury without another party on site and you may be accused if items “disappear” around the time of your visit. Arrive on time and try not to park your vehicle in the driveway (you don’t want the insured, who already may be unhappy with ongoing events, to complain to the client about that oil spot on his new driveway). Bring booties or take off your shoes when entering a residential property. You may encounter contentious individuals on these site inspections, and these simple courtesies may make you a bit more welcome.

Obviously, each site inspection is going to be different, but there are certain things that are common to all. First, visually and photographically document the site, using a “drill-down” procedure. Start by assessing the structure as a whole on the lot, then move to individual sides of the structure, then to individual rooms, then to the more specific location(s) of the loss or the damage from the loss. Obviously, if the loss is localized to a bathroom, for instance, you do not need to look at and photograph every room in the house but think about the extent (and possible extent – the actual extent may not yet be realized) of the damage and be certain that you take a look in those areas. There may be times when an insured will complain to your client that the engineer never looked at the damage in the downstairs, he only looked upstairs. Nobody likes a return trip to the insured risk for this reason, and your client will probably not want to pay for it, so be thorough at the initial site visit.

If you are dealing with external damage, focus not only on the immediate damage, but on corollary damage as well. Corollary damage is other damage (or lack of it) that may have resulted from the event in question on the structure, on external site components or outbuildings, or on other structures in the neighborhood. The presence or absence of corollary damage is critical to determination of hail damage and may well be critical to determining other storm damage. In particular, corollary damage assessment is very important - if not vital - when assessing CAT losses, especially “wind vs. water” cases.

CASE STUDY *Resources*



The National Weather Service can provide maps of severe weather. Here is tornadic activity in April 2014 in NC. This was used in a tornado damage assessment report.



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Either in the background or at your site inspection, the insured will likely tell you what he believes is the cause of the damage. Listen carefully and make notes, but it is very important to verify the information, particularly if it doesn't sound quite right. It is perfectly normal for an insured to believe he knows why an event occurred, when an event occurred, or to have his own interest in mind, and it is not uncommon for critical factors to be unmentioned or misunderstood. Although we hate to say it, the whole truth may not always be told. "Trust but verify....".

On site, take measurements necessary to your investigation, but you are not expected to fully document the extent of damage, nor perform detailed measurements for preparation of replacement estimates unless specifically requested. Detailing the damage is one role of the insurance adjuster. It helps to take

sufficient measurement to produce a sketch of a floor plan, for example, if one may ultimately be needed, but in most property cases, a sketch is not always a necessity.

There is a difference in opinion among practicing engineers regarding what information you should share with the insured. Some share nothing, others share cautiously. First, the insured will often ask if the loss is covered. Never imply nor suggest a direct answer to this question. Determination of insurance coverage of the loss, if it has not already been determined, is not the responsibility of the forensic engineer but is that of the adjuster. I suggest that you simply state this fact in response and don't go any further. Whether the loss is covered or not is not the concern of the forensic engineer. With respect to your opinions, I suggest that you can offer a basic summary of your observations, but I condition this statement on the fact that I need to go to my office and review all my notes and photographs prior to forming any firm opinions. While on site, we simply do not take in everything, and I find it extremely helpful to look at my many photographs on the big computer screen in my office, even before I call the client with an initial verbal report. Sometimes, you see things that make a difference that you did not see on site. If this happens, and if it is important, I will often return to the site at my own cost to check it out. Fortunately, this has happened rarely, but it does happen.

CASE STUDY
Google StreetView



The leaning of this canopy was claimed to have been caused by a very strong windstorm with a well-defined date of loss. This *Google StreetView* photo taken 5-years prior to the event suggests otherwise.



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Often property losses are caused by an issue that might involve the responsibility of others, leading to the potential for subrogation, as discussed earlier.

Before you leave the site, ask yourself what else you need to do, or “what did I miss?”. Just stop and think for a moment and you may avoid a return visit.

Follow-on parts of this course may go into the conduct of detailed site inspections for specific loss events.

Joint Site Inspections

Often in property cases, but particularly in large loss cases, you may be asked to attend a joint inspection. Joint inspections occur when there may be multiple parties who may potentially have had some responsibility for or have possibly been associated with a loss. The insurer for the affected property or business generally assigns the case to a lawyer, who then sends out a notification of possible involvement and an announcement of a joint site inspection to basically everyone he can think of who may have been responsible. This

THE INSURANCE ADJUSTER

The insurance adjuster has a good-faith role that can be generally defined as:

1. Investigate the loss;
2. Determine extent of damage;
3. Determine if the loss is covered by the policy;
4. Determine the amount to be paid.

If the adjuster feels that a professional opinion is needed, typically to determine cause of loss or extent of damages, he will consult with an appropriate individual – perhaps you. Just remember that you are not the adjuster, your role is to provide a professional opinion regarding the loss.

ADJUSTERS



Insurance adjusters are often your client, but not always. There are adjusters that work directly for the insurance company, and there are independent adjusters (IA's), who also generally work on assignment for an insurance company. But, there are also public or private adjusters (PA's), who work for the insured and whose job it is to get the largest claim settlement possible. Some of these folks have been known to overstate damages and causes, and you will likely meet them occasionally on site. Listen and consider, but just 'cause they say so doesn't make it so...

scattershot approach may be appropriate in cases when the origin is known but the cause has not been determined. The joint inspection provides each party the opportunity to inspect and photograph the site and the site conditions (if the inspection is at the site of the event), or to inspect and photograph the evidence, which may have been removed from the site under controlled conditions.

At the joint inspection, there will often be engineers representing most of the notified parties if that party has chosen to attend. Often there will be lawyers present, and the lawyer that called for the inspection will almost always be there.



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An engineer retained by the property insurer usually leads the inspection, and he will normally provide a background and history of the loss. It is not unusual to have five or six engineers and a few lawyers in attendance particularly at a large loss inspection, at a fire-related inspection, or at an inspection where personal injury has occurred. Normally all attendees are asked to sign in, and the attendance sheet is copied to all. Evidence in the case will be or has been taken, usually by the engineer leading the inspection. You will be allowed to photograph the scene and the evidence to your heart's delight.

The inspection may be a destructive examination, during which the evidence will eventually be disassembled or otherwise compromised in such a way that the evidence will be destroyed or affected such that the original condition of the evidence cannot be restored. Often this means opening a valve or an otherwise sealed device to inspect the internals. Prior to opening, the component may be functionally tested in the presence of the attendees. The engineer conducting the inspection will normally have prepared and distributed an inspection protocol, listing the procedures that he intends to follow at the inspection. Typically comments on the protocol are evaluated and reasonable suggestions of attendees are considered.

Upon completion of the joint inspection, you will advise your client verbally of the results. The client may or may not ask for a report or for photographs of the event. He is going to assess whether there is culpability on the part of his insured with regard to the event and decide how to proceed with the case from that point on. If you are not asked to prepare a report, be prepared to provide one at a later time.

CASE STUDY
Photography



Here is a heater coil failure with close-up photo from an SLR and even closer from a USB microscope on its low 40x setting. The USB can do 400x as well but I find the 40x really useful for detailed evaluations, and leave the 400x to the metallurgist. This is a freezing case.





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Photography

The digital camera has taken away any excuse for not having a photo of everything on site that matters relative to the particular loss at hand. An average property site inspection should yield about 100 photographs, although you may only use 15-to-20 in your report. I have taken 400 to 500 photos at a number of site inspections. You should take site photos, room or area photos, and close-up photos. The latter are particularly useful for events such as pipe failures, cracking in walls and foundations, localized deterioration of wooden structures, hail damage, and other similar situations. For these photos, you need a good quality point-and-shoot camera with a macro capability. Aerial photos and Google StreetView photos have been discussed previously and are a critical part of the photo documentation process.

A macro camera setting lets you take very close-up (to within a few centimeters depending on the camera and lens) photos that are extremely useful to observe the detail and to demonstrate the damage or the cause of the damage. The macro is a camera setting and does not require a change of lenses. You will have to experiment with the flash to determine if you have shadowing when working this close, and it is very useful to have a small LED flashlight to light the subject in lieu of the camera flash. You can also light the subject from varied angles to emphasize your subject or highlight the photo content.

CASE STUDY Photography



For hail damage cases it is very important to have good macro photos of the indications. Indications should be compared with available photos of typical hail and non-hail damage, and the photo is also very useful to demonstrate granular loss and damage to the mat of the shingle. It is not enough to just state that there is hail damage, you also have to *demonstrate* it.



This is not hail, but the roofer alleged that it was.



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Your camera should also have a good optical telephoto capability, and this can be extended with a digital capability, but you will lose quality as you extend with the digital portion.

If an appliance or component is involved, find and photograph the manufacturer nameplate along with any other identifying information, such as certification stamps or labels. For virtually all appliances, you can obtain the date of manufacture from the model and serial number.

Leave your thousand-dollar camera in the lab. Using a camera in the field places it in danger of damage and you simply don't need to drop that expensive camera off a roof. I have found it best to purchase used cameras on line, typically for \$50 to \$100, and they have more capability than I will ever use in the field. Carry a spare camera in your vehicle, or you can use an iPhone or cell phone as a backup. Carry extra batteries for your camera as well.

Don't try to save memory by using a low-resolution setting for your photos. Higher resolution photos pay off when you want to see some detail in the photo or when you need to print the photos for presentation or use as evidence. However, too many pixels will kill transmittal of your emails and reports if they contain a number of photos. I suggest an intermediate, moderate size setting for your fieldwork, and a higher resolution for selective lab photography. You can reduce the size of the report photos in Word (while retaining the high density original) if you use that program.

USB microscopes have become available that are very useful when photographing evidence in the lab or office, and they are very inexpensive at less than \$100. If you have a steady hand, you can also use these in the field with your laptop. Typically, you can get 40X to 60X at the low magnification focus point and 400X or more at the higher end (don't even try this magnification in the field!). These are obviously not as good as a full lab microscope, but we may not all have the luxury of owning such a device.

When you return to the office, upload all photos to your computer and save them. Do not delete any! Your files may be in discovery several years later and you don't want to be in the position of explaining the missing photos. If you annotate photographs for use in a report or otherwise, make a copy of the photo first, then annotate the copy.

Document Review

On occasion, you will have an assignment that involves a desk review of written materials or an inspection of evidence that may be forwarded to you. You may be provided copies of reports, photographs, specifications, drawings or other material and your opinion requested on possible origin and cause, or of the potential for involvement of the client or their insured with respect to



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liability or subrogation. In general, you are being asked to overview an existing situation and provide an opinion on the case that will assist the client. He may have to make a coverage decision, but more likely is asking for help in assessing the conditions of the case so that he can develop a proper response to a notice of potential liability or of subrogation.

Here, you should proceed carefully and cautiously. Be sure that you have sufficient information to understand the background of the case and the details of the event. You should list each document that you review and annotate the document or make reasonably detailed notes as you proceed through the document. You will generally want to list the documents reviewed in your report as well. If you end up reviewing a deposition transcript, take your time, make detailed notes and highlight items of importance to your review. Organize your notes by page and line number so that you can easily find them later.

If reviewing documents that may later be introduced into evidence, I like to make specific comments on the document or in my notes that point out the errors I observe and why I believe the error is present. This may have an effect later to dissuade an attorney from introducing my notes or marked-up document into evidence, as the notes may actually harm his case.

You will not always be asked to provide a report on a desk review, but you should be prepared to prepare a report six-months or a year later if asked. If the case goes to litigation, your report will likely be needed, but not for several years in some cases.

If you have the opportunity to review an engineering report, you will certainly be looking to determine, among other items:

CASE STUDY
Metallurgy



This case arose from a document and evidence review. The fitting failed across the threads at a flexible hose connection, which doesn't put much bending stress on the nozzle. The material was sent to a metallurgist who determined that the cause was stress corrosion cracking.





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- a. If the presented engineering opinions seem to reflect the conditions of the event, and if they make sense;
- b. If there are weaknesses in the report, such as potential causes or factors that are not mentioned in the report but should have been considered;
- c. If the report is thorough;
- d. If there are obvious errors in the report;
- e. If the scientific or technical bases upon which the engineer has arrived at his conclusions are present, clear and correct;
- f. If a defect is alleged, that it is clearly and precisely demonstrated;
- g. If photographs are provided and are captioned to demonstrate both the conditions and the opinions;
- h. If the engineer overlooked an issue or should have done something else as part of his effort;
- i. If the report is signed and sealed;
- j. How strong is his case?

Your client is likely trying to determine if the case can be defended with a chance of success – that is what he really wants to know from you.

Codes and Standards and Standard of Care

In property cases, and particularly in product liability cases, defects - manufacturing, design, installation or construction - are alleged by claimants on a variety of legal bases. The legal details are intricate and can vary state-to-state, and we need not be overly concerned with the legal bases upon which a lawsuit may be filed. As a practicing forensic engineer, we often offer an opinion that such a defect exists and provide a basis for that opinion. The bases typically involve issues of non-compliance with applicable codes and standards, manufacturer's instructions, or upon failure to meet a particular standard of care. On the other hand, we often evaluate cases and offer an opinion that there is *no* defect and we state the bases for that. A forensic engineer does not claim or allege the defect, we *opine* it.

BUILDING CODES



If you present an opinion that there is a construction defect related to non-conformance with a building code, be certain that you reference the **applicable** building code, not a current building code. Provide a reference to the particular section of the code that is not met and quote the referenced text in the body of the report, or scan the section and place it in an attachment to the report.

The primary standard involved in construction of property is the applicable building code. Building codes are imposed by the state and/or local jurisdictions, and typically enforced by a



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city or county inspections authority. In the majority of cases, a national standard building code is adopted and accepted with or without modifications, by the responsible state agency, and cities, counties and towns in the state implement it. The applicable dates of adopted codes are published however you need to understand that there is a lag in the process due to the evaluation and implementation periods. Thus, do not assume that the 2006 state building code was adopted in 2006; it may not have been adopted until 2007 or 2008, if at all. In most states, the current building codes are based on the model International Code Council (ICC) series of codes, which are updated with regularity. Among the ICC Codes are the International Building Code, International Residential Building Code, International Fire Code, International Plumbing Code, International Mechanical Code, and others.

Bear in mind that older construction may have been in accordance with other codes or may not have had building codes applicable at all. Some large cities developed their own codes as well. Prior to 1997, when the IBC was first published, there were several regional code organizations – Building Officials Code Administrators International (BOCA), Southern Building Code Congress International (SBCCI), and International Conference of Building Officials (ICBO), all of which combined to form the ICC. If you are seeking to identify the applicable building code(s) for a case, check first your state code authority, then the local inspection authority. Most codes are now on line, either readable without charge or available for purchase. Your local inspection agency may have hard copies of the earlier applicable codes. ICC also sells the older (legacy) codes on line.

**INTERNATIONAL CODE
COUNCIL (ICC)**

The International Code Council develops and publishes a set of building codes that are largely adopted by the various states (49 states have adopted the Residential Code). These are issued as model codes and also by specific state where necessary. ICC sells them directly, although there are some codes that are available without fee, and some states provide access to their codes for viewing only.

ICC also sells legacy codes (BOCA, SBC, etc), which are particularly useful when dealing with older structures.

The National Fire Protection Association (NFPA) develops and sells codes related to fire protection, including building fire safety, and sprinkler and alarm systems. Both the American Society of Civil Engineers and the American Society of Mechanical Engineers develop and sell civil-structural and mechanical codes as well. The various states incorporate these industry-developed codes either explicitly or by reference within their building code system. States do modify the Codes, and their modifications are published in the applicable code printing and usually on the applicable state website.



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It is important that you understand that, with some exceptions, a building is only required to meet the code or codes in effect at the time of construction, effectively on the date on which the building permit is issued. An older building does not have to meet the current codes unless there are specific legal reasons involved, such as a serious issue of public safety. If this occurs, it will be formally addressed and approved by the responsible agency(ies) and a public record of such required compliance will be made. Some states may require full compliance with current codes if a system or structure is rebuilt after having been damaged to a defined degree, that degree often based on market value. In most cases involving older structures, the International Existing Building Code (IEBC) will apply to the repairs. You would be surprised how many engineers incorrectly think the current International Residential Code (IRC) applies. If in doubt, contact the authorized local inspection agency. The state agency responsible for code development has staff available for consultation as well.

The various ICC codes incorporate many other standards by reference, which means that the standard is required to be met to the extent that it is referenced. A quick look at the Referenced Standards (Chapter 43) of the IBC will demonstrate just how many other codes and standards are implemented by the IBC for use. If your particular case involves a failure to meet a properly referenced standard from the applicable code, then it is also a violation of that applicable building code. The violation of the code or standard forms a very strong technical basis for an opinion that there is a construction defect.

For products, another standard that you might want to consider is that established by the manufacturer as the proper installation procedure. These typically go beyond the building code requirements and provide a good basis to determine if the installation of a component was properly made. For such a basis to be effective, you should make every effort to determine the specific manufacturer of the particular product involved in your case. For instance, not all roof shingles have the same installation instructions. If you are unable to identify the actual manufacturer, you might offer instructions from other various and well-known manufacturers to establish the generally accepted methods of installation and use that as a technical basis for your opinion. Often you will find industry publications that will also support this basis.

STANDARD OF CARE

I particularly like the definition of Standard of Care for engineers as stated by Jeremiah[Ⓞ]:

"The classic statement of the professional standard of care for an engineer is that the engineer must possess that degree of skill and learning ordinarily exercised by other engineers in good standing in the community and must apply that knowledge with the diligence ordinarily exercised by reputable engineers under similar circumstances."

[Ⓞ]Engineering Expert Witness Testimony, The Professional Engineer, Spring 2012, Douglas P. Jeremiah



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The other important standard is the Standard of Care. The definition of Standard of Care varies from state-to-state, but in essence it is as expressed by the USLegal dictionary as:

“Standard of care refers to the degree of attentiveness, caution and prudence that a reasonable person in the circumstances would exercise. Failure to meet the standard is negligence, and the person who fails to meet the standard is liable for any damages caused by such negligence. The standard is not subject to a precise definition and is judged on a case by case basis.”

If you believe that an event may have resulted from a standard of care issue, you should be aware what that really means, and provide a basis that discusses your reasons for forming this opinion.

A common example of an installation or workmanship defect is the failure of a plumber to fully tighten a compression fitting for water supply tubing, or to have used pipe dope or teflon tape when making that connection. The plumbing codes may not cover this, but the manufacturer instructions generally provide a procedure for making such a joint. One could reasonably expect that any licensed, experienced plumber would be aware of a proper procedure for making this commonly used connection. Your bases for your opinion may well be that 1.), the manufacturer instructions were not followed, and 2.), that a licensed plumber would be expected to make the joint properly, and 3.), you may find some physical evidence to demonstrate that the fitting was not tight. Practically, the latter would likely be a necessary component in forming this opinion. You should not make as part of your opinion that a “standard of care” has been violated. That is for others to decide. You should present only your technical and scientific bases, and do not accuse that there is a violation of a law or legal standard.

Here is an example set of opinions that represent construction deficiencies:

1. The leak is a result of water intrusion through the ceramic tile into the gypsum-based tile backer (name deleted) for the horizontally surfaced, ceramic tiled tub surround. This particular gypsum-based product is not *approved* and therefore not allowable for such use in accordance with either the 2003 or 2006 NC Residential Building Code.
2. The use of such material in this application is not in compliance with the applicable building code and is therefore a construction defect on the part of the builder.



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3. The shower seat was installed without allowing for water runoff by sloping the seat slightly to the interior of the shower. This allowed ponding of the water on the seat and was very likely the source of the leak near the rear of the shower. Installation without a drainage slope is poor construction practice and does not meet generally accepted construction practice.
4. The precise point(s) of leakage cannot be determined, as the affected area has been disturbed by the contractor during his recent visit.
5. The leakage has been ongoing for several months, and possibly up to one year. This is based upon the dark staining observed on the underside of the subfloor as viewed from the ceilings below. I do not think that the subfloor is structurally damaged.

Does This Make Sense? - It's Not Always What It Seems...

As a practicing forensic engineer involved in property work, you will find instances where an individual makes a statement that does not seem to make sense (or uncover documentation that appears to disprove or conflict with the individual's statements). For example, you may be investigating a hail claim, where the damages do not resemble hail damage - they resemble mechanical and possibly man-made damage, and you have doubt that a hailstorm actually occurred on site. You verify the weather, possibly by requesting a site-specific weather report, and find that there was no hail within ten miles of the site on the date of loss, and no reported hail within the month or so preceding the date of loss. You may wish to verify the date of loss with the insured, but it is reasonably clear that a suspicious claim is being made.

Your role should be only to report that the alleged hail damage is not hail damage, it is mechanical or other damage, and that the site-specific weather report indicates that there was no hailstorm at the site on or near the date of loss. Do not place yourself in the position of being an accuser, simply report the facts and the bases leading to the formation of your opinion that hail was not responsible for the damage. You will, of course, also provide close-up photography demonstrating the difference between hail damage and mechanical damage.

The insurance companies have fraud investigators who, on the basis of your report, may investigate the situation further. If they then feel that a form of fraud is evident, they will act on it. You may eventually be called to testify, but only for the information and opinions that you have provided in your report.



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Not all circumstances where you are provided incorrect information are deliberate. Be aware that people form opinions or make statements that they totally believe are correct, even though they may not be scientifically correct or even possible. This is not fraud. It is advisable to listen carefully and make notes of what various parties tell you, and in most cases, the information is correct. However, verify the information if at all possible, do not simply accept statements as fact. Does the information pass the sanity test - is it feasible and consistent with other information that is available? Be advised that you may often find your opinions in conflict with the insured and with other parties, and that is perfectly acceptable as long as you are correct and can demonstrate that you are correct.

Notes

It is highly appropriate to take notes in the course of your investigations, and a good set of notes will serve you well if the case ever goes to litigation. However, for most property cases, extensive notes are not a necessity. I have found that note taking is most valuable in gathering the history and background of the event, particularly that expressed by the insured. On-site notes of room dimensions, building sizes, etc. are rarely required for most property cases, although I certainly can't fault you if you do take extensive notes. A simple not-to-scale sketch may be sufficient to provide damage locations or relevant dimensions if the damage is generalized to different locations. Better than notes in my opinion is good photography, especially when you can place a ruler or coin to show the relative sizes involved. You can take a photo of a level to show an out-of-plumb condition.

In large loss cases, notes become more important. First the damages may be more complex and more widely spread. Secondly, the case is more likely to go to litigation, and you may need to recall details for a report that won't be written for a year or two. Further, the notes may assist you in preparing for deposition and testimony. Be aware, however that your notes are discoverable and that the opposing lawyer may request them and then question you on the details and content. Use good judgment in what you write.

Forming Opinions

Your engineering assessment of facts and data leads to the formation of your engineering opinions. Forming these opinions are the reason why you were retained for the assignment, and is the essence of what we, as forensic engineers, do. How we do that makes a difference.

Your opinions result from a careful assessment of the background, inspection, research and testing that you have completed. Do not form premature opinions - what your impression is



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when you leave the site inspection will not necessarily be the opinion you have when you have thoroughly evaluated all the aspects of the case. This happens often enough such that it is not good practice to offer your opinion too early. I hold off even in providing a verbal report until I bring all my photographs up on a large computer screen and review them. If I am confident enough at that point, I will provide a preliminary opinion, but try to condition it appropriately. If I change my position, the client is notified ASAP.

Your opinions must be presented clearly, and you should state the technical and scientific basis for each formed opinion within the opinion. Do not rely on the reader to go back into the text of your report to try to find what you used or why you formed that opinion. Instead, summarize those reasons at the time that you provide your opinion, then the reader can go back to your report for more detail if he wants it. The best approach is to provide a separate section containing only your opinions, with a bullet containing each opinion and its bases, for each of the several opinions you may have provided in a given report. The bullet generally needs to have only two or three sentences to be effective.

Your opinions should be firm and conclusive. Wishy-washy opinions are of little value to your client, he likely won't be able to use them and will come back at you for clarification. A conclusive opinion makes a clear statement that is relevant to the clients need and is highly appreciated in that respect.

Your opinions should cover the origin, cause and timeframe of the event, as well as corollary information that will enable the client to make a coverage decision or otherwise act on the contents of your report. Don't forget to cover any other specific issues that you were asked to assess.

Do not state opinions unless you can back them up with a proper rationale. It is insufficient to simply state an opinion without a basis, and just because you state it doesn't make it so. You should be able to defend your opinion with facts and the application of science. If you aren't able to do that, then don't state the opinion. You are able to rely on your

NOTHING IS 100% CERTAIN



Because nothing in life is certain, neither are people's opinions, including those of the professional engineer. We offer our best possible expert opinion based on our careful review of the data and the facts, and upon our training and experience.

It is perfectly proper to qualify your opinions to the degree necessary – in almost every engineering report you will find a qualifying statement “to a reasonable degree of engineering certainty”. It is also appropriate to qualify your opinions by including the modifiers “likely”, “highly likely”, or even “to a high degree of certainty” when appropriate to do so. The additional modifiers can be used to firm up the opinion as well as to weaken it a bit when and if necessary. Firm opinions are the most desirable.



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experience as a portion of your basis for an opinion, and you can say so, but I strongly advise that you have more data or facts than just your experience to support the opinion.

The reason for all of this care in the presentation is that your opinions will be challenged. If you initially provide clear, concise and well-supported opinions, then any challenge will be harder to make and have less chance of success.

Thoroughness – *No Fly-bys and No Returns to Site.*

I have reviewed a lot of engineering reports. Probably the most irritating are those where the investigator just did not do a thorough and complete job at the site investigation. His opinions are wishy-washy, and he provides little supporting data, including detailed photos, to support his effort or his opinions.



NO FLY-BY'S!

We call these “fly-by” inspections, and they nearly always lead to difficulty. Most often, the results are challenged, and the call is made for the engineer to return to the site and re-assess or re-inspect. This is not desirable to any of the parties, and often leads to an unhappy client. Take your time on site, be thorough, document well, and ask yourself before you leave if you have done everything necessary to fully assess the situation. Murphy’s Law says that if it occurs to you that maybe you better take a look in the attic, and you don’t, that you will have missed something up there. Don’t be lazy.

Cost Considerations

Be very certain that you understand that the economics of a small loss case do not support a large engineering evaluation. You need to realistically understand the fact that a \$5000 loss will not generally support a \$10,000 engineering effort. On the other hand, a large loss – say \$1 million - will generally require a more detailed and more involved engineering involvement, especially if it goes to litigation. Wisely keep your effort in perspective, assess and control your billings and you will later have other opportunities with your client. Clear extra time requirements and unusual or costly expenses with your client beforehand. Don’t just send that failed part off to a metallurgist for a materials testing, clear it with the client first.



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7. REPORTS

The intent of this section is not to make you into a great report writer - it is to identify and emphasize the content of the report relative to the later uses of the report by the many parties that may read it, review it, or challenge it. We want to make life easy for most of these folks, and we want to do our best to bulletproof the report against criticism by opponents.

We all write differently, just remember: be Clear, Concise and Complete. Approach your report considering on the size of the loss and/or the potential for legal action – keep in mind the costs to the client and keep your report in cost perspective.

Examples of forensic engineering reports are relatively hard to find, as they are most often held in privacy. For an overview of an all-inclusive report, it is strongly suggested that one read the reports generated by the National Transportation Safety Board (NTSB) relative to aircraft, marine, highway, railroad and pipeline events. These are very thorough and complete and are excellent examples of forensic work. Don't forget that these reports have required hundreds or thousands of professional hours, and often extensive testing, neither of which is common to property losses.

Purpose of the report

In a nutshell, the engineering report presents a stand-alone assessment of certain conditions or events, the opinions formed by an independent, trained and experienced party relative to the origin, cause and time frame of the event, and the reasons upon which the opinions were based. The report should contain a sufficient description of the actions asked of the engineer, the background leading to the event, the investigation undertaken by the engineer, the research, analysis and testing performed in the course of the investigation, the relevant findings resulting from the investigation, and captioned photographs demonstrating the inspection, testing and general results of the investigation. However, the primary purpose of the report is to present and to document the opinions formed as a result of the engineering investigation.

“Stand-alone” means that the reader should be able to obtain a complete understanding of “who, what, where, when and how” the event occurred based strictly on the content of the report. This means that the background, the property, the investigation, and the results should all be presented such that the reader is able to form a reasonably complete picture as to what happened and is able to understand - whether he is a layman or a technical professional - the consequences of the event.



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Prepare your report with the big picture in mind - you have been to the site and done the homework, but your readers have not had this level of involvement or opportunity. Provide your experience to them as best you can such that they can associate with the event and can come away from the report understanding what is going on.

The Big Picture - Your Audience

There is not a single individual that you are writing your report for, even though you may have been retained by a certain adjuster or lawyer. You should realize that your audience is much larger in size and depth, and your approach and preparation strategy must consider this.

The wise engineer understands that the report may be reviewed, critiqued, and possibly challenged by an expert engineer with solid experience and credentials. Or, the report may be reviewed by an experienced lawyer in the appropriate field, who will be looking for the weaknesses in the report and planning to depose you or cross-examine you in court. Therefore, the wise engineer writes the report to deflect critique and maximize credibility.

These other individuals may read, review and critique your report:

- Your peer reviewer;
- Your client;
- Your client's supervisor;
- Your client's supervisor's supervisor;
- Your client's supervisor's manager;
- Your clients subrogation specialist;
- Your client's legal counsel;
- The insured or the claimant;
- The insured's or claimant's lawyer;
- The insured's or claimant's lawyer's expert engineer;
- The arbitrator;
- The judge.

Preparing the Report

Here are ten suggestions that will enhance your report, increase the understanding of your audience, and minimize the potential for questions or comments:



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1. Above all, express your opinions clearly, firmly, and completely, and provide the basis for them. Summarize the bases of each opinion at the same time as you present the opinion, don't make your reader search the body of the report to find out why you have this opinion;
2. Use photography and captioning to demonstrate your opinions and to reinforce your points to the reader. Caption each photo such that you have conveyed to the reader why you selected the photo as part of the report. The caption should tell the reader what you want him to see in that photo. Annotate your photos to demonstrate your opinions or to otherwise assist the reader;
3. Typically, the larger the loss, the more detail should be in the report;
4. Provide sufficient background such that the reader understands and can relate to the event and the conditions that preceded it. Describe the property in terms of size, construction, placement on the lot, year of construction, etc., and its condition prior to the event. Tell the reader what the loss involves and what you have been asked to do. Summarize the weather if weather is a factor. Discuss what is reported to have happened and what actions were taken by relevant parties related to the event;
5. Walk the reader through your site inspection and follow-on testing. Explain what you did, the process and precautions you took, what you observed, and in some cases what you did not observe. Save your opinions for later;
6. Do not fill the report with boilerplate. If you love boilerplate, put it in an appendix or an attachment;
7. You do not have to convince the reader that you are an expert. Leave out all the theory about what could have happened. If you think that you must assist the reader in understanding the science or technology you used in order for him to understand how you formed your opinion, take advantage of the Discussion or Analysis section to provide a brief overview directly related to your opinions. Don't fill the report with superfluous information;
8. Use footnotes to reference your sources - document and give credit to your technical sources. If a large loss report, list the documents that you reviewed;
9. Think broadly, do not over-focus, guide the reader to the root cause of the issue;



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10. Use Attachments or Appendices if necessary to provide the reader copies of relevant information - detailed weather reports, an opposing engineer report, sections of a building code, etc. If you comment on another report or critical document, summarize that document early in the report and provide a full reference to it, or put it in an Attachment if possible. For the reader, there is nothing worse than trying to comprehend your comments on a document when you don't also present the document.

Definitions

Be aware that the insurance industry defines certain words in a particular way. These definitions are typically found in the standard homeowner policy (HO-3, HO-5, etc.). Among particular definitions to be careful with are “collapse” and “flood”. When preparing a report it is best to avoid using these terms unless you are certain that you are using them in accordance with the definition normally used by the insurance industry. You can find the definition for “collapse” in a HO-5 policy. A flood is not covered by a homeowner policy, it is an excluded risk that requires a separate policy from the FEMA National Flood Protection Program. The definition of “flood” is on the FEMA website. For instance, be careful using the word flood in conjunction with a plumbing loss. It may be mis-interpreted and cause a “no coverage” decision when in fact it may be a covered loss.

If you become involved in hurricane CAT losses, there is always an issue if there is a significant storm surge associated with the storm. Here, the definition of “flood” is very important, as the distinction must often be made as to whether the property damage is caused by wind or by water (“wind vs. water”). Hurricane Katrina had remarkable storm surge and there was extensive litigation involving this particular determination.



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ATTACHMENT A –
RULE 26 OF THE FEDERAL RULES OF CIVIL PROCEDURE



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RULE 26 OF THE FEDERAL RULES OF CIVIL PROCEDURE: GENERAL PROVISIONS
REGARDING DISCOVERY; DUTY OF DISCLOSURE

(a) REQUIRED DISCLOSURES; METHODS TO DISCOVER ADDITIONAL MATTER.

(1) Initial Disclosures.

Except in categories of proceedings specified in Rule 26(a)(1)(E), or to the extent otherwise stipulated or directed by order, a party must, without awaiting a discovery request, provide to other parties:

- (A) the name and, if known, the address and telephone number of each individual likely to have discoverable information that the disclosing party may use to support its claims or defenses, unless solely for impeachment, identifying the subjects of the information;
- (B) a copy of, or a description by category and location of, all documents, data compilations, and tangible things that are in the possession, custody, or control of the party and that the disclosing party may use to support its claims or defenses, unless solely for impeachment;
- (C) a computation of any category of damages claimed by the disclosing party, making available for inspection and copying as under Rule 34 the documents or other evidentiary material, not privileged or protected from disclosure, on which such computation is based, including materials bearing on the nature and extent of injuries suffered; and
- (D) for inspection and copying as under Rule 34 any insurance agreement under which any person carrying on an insurance business may be liable to



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satisfy part or all of a judgment which may be entered in the action or to
indemnify or reimburse for payments made to satisfy the judgment.

(E) The following categories of proceedings are exempt from initial disclosure

under Rule 26(a)(1) :

- (i) an action for review on an administrative record;
- (ii) a petition for habeas corpus or other proceeding to challenge a criminal conviction or sentence;
- (iii) an action brought without counsel by a person in custody of the United States, a state, or a state subdivision;
- (iv) an action to enforce or quash an administrative summons or subpoena;
- (v) an action by the United States to recover benefit payments;
- (vi) an action by the United States to collect on a student loan guaranteed by the United States;
- (vii) a proceeding ancillary to proceedings in other courts; and
- (viii) an action to enforce an arbitration award.

These disclosures must be made at or within 14 days after the Rule 26(f) conference unless a different time is set by stipulation or court order, or unless a party objects during the conference that initial disclosures are not appropriate in the circumstances of the action and states the objection in the Rule 26(f) discovery plan. In ruling on the objection, the court must determine what disclosures - if any - are to be made, and set the time for disclosure. Any party first served or otherwise joined after the Rule 26(f) conference must make these



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disclosures within 30 days after being served or joined unless a different time is set by stipulation or court order. A party must make its initial disclosures based on the information then reasonably available to it and is not excused from making its disclosures because it has not fully completed its investigation of the case or because it challenges the sufficiency of another party's disclosures or because another party has not made its disclosures.

(2) Disclosure of Expert Testimony.

(A) In addition to the disclosures required by paragraph (1), a party shall disclose to other parties the identity of any person who may be used at trial to present evidence under Rules 702, 703, or 705 of the Federal Rules of Evidence.

(B) Except as otherwise stipulated or directed by the court, this disclosure shall, with respect

to a witness who is retained or specially employed to provide expert testimony in the case or whose duties as an employee of the party regularly involve giving expert testimony, be accompanied by a written report prepared and signed by the witness. The report shall contain a complete statement of all opinions to be expressed and the basis and reasons therefore; the data or other information considered by the witness in forming the opinions; any exhibits to be used as a summary of or support for the opinions; the qualifications of the witness, including a list of all publications authored by the witness within the preceding ten years; the compensation to be paid for the study and testimony; and a listing of any other cases in which the witness has testified as an expert at trial or by deposition within the preceding four years.

(C) These disclosures shall be made at the times and in the sequence directed by the court. In



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the absence of other directions from the court or stipulation by the parties, the disclosures shall be made at least 90 days before the trial date or the date the case is to be ready for trial or, if the evidence is intended solely to contradict or rebut evidence on the same subject matter identified by another party under paragraph (2) (B), within 30 days after the disclosure made by the other party. The parties shall supplement these disclosures when required under subdivision (e)(1).

(3) Pretrial Disclosures.

In addition to the disclosures required by Rule 26(a)(1) and (2) , a party must provide to other parties and promptly file with the court the following information regarding the evidence that it may present at trial other than solely for impeachment:

(A) the name and, if not previously provided, the address and telephone number of each

witness, separately identifying those whom the party expects to present and those whom the party may call if the need arises;

(B) the designation of those witnesses whose testimony is expected to be presented by

means of a deposition and, if not taken stenographically, a transcript of the pertinent portions of the deposition testimony; and

(C) an appropriate identification of each document or other exhibit, including summaries of

other evidence, separately identifying those which the party expects to offer and those which the party may offer if the need arises.

Unless otherwise directed by the court, these disclosures must be made at least 30 days



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before trial. Within 14 days thereafter, unless a different time is specified by the court, a party may serve and promptly file a list disclosing (i) any objections to the use under Rule 32(a) of a deposition designated by another party under Rule 26(a)(3)(B), and (ii) any objection, together with the grounds therefor, that may be made to the admissibility of materials identified under Rule 26(a)(3)(C). Objections not so disclosed, other than objections under Rules 402 and 403 of the Federal Rules of Evidence, are waived unless excused by the court for good cause.

(4) Form of Disclosures.

Unless the court orders otherwise, all disclosures under Rules 26(a)(1) through (3) must be made in writing, signed, and served.

(5) Methods to Discover Additional Matter.

Parties may obtain discovery by one or more of the following methods: depositions upon oral examination or written questions; written interrogatories; production of documents or things or permission to enter upon land or other property under Rule 34 or 45(a)(1) (C), for inspection and other purposes; physical and mental examinations; and requests for admission.

(b) DISCOVERY SCOPE AND LIMITS.

Unless otherwise limited by order of the court in accordance with these rules, the scope of discovery is as follows:

(1) In General.

Parties may obtain discovery regarding any matter, not privileged, that is relevant to the



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claim or defense of any party, including the existence, description, nature, custody, condition, and location of any books, documents, or other tangible things and the identity and location of persons having knowledge of any discoverable matter. For good cause, the court may order discovery of any matter relevant to the subject matter involved in the action. Relevant information need not be admissible at the trial if the discovery appears reasonably calculated to lead to the discovery of admissible evidence. All discovery is subject to the limitations imposed by Rule 26(b)(2)(i), (ii), and (iii).

(2) Limitations.

By order, the court may alter the limits in these rules on the number of depositions and interrogatories or the length of depositions under Rule 30 . By order or local rule, the court may also limit the number of requests under Rule 36 . The frequency or extent of use of the discovery methods otherwise permitted under these rules and by any local rule shall be limited by the court if it determines that: (i) the discovery sought is unreasonably cumulative or duplicative, or is obtainable from some other source that is more convenient, less burdensome, or less expensive; (ii) the party seeking discovery has had ample opportunity by discovery in the action to obtain the information sought; or (iii) the burden or expense of the proposed discovery outweighs its likely benefit, taking into account the needs of the case, the amount in controversy, the parties' resources, the importance of the issues at stake in the litigation, and the importance of the proposed discovery in resolving the issues. The court may act upon its own initiative after reasonable notice or pursuant to a motion under Rule 26(c) .



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(3) Trial Preparation: Materials.

Subject to the provisions of subdivision (b)(4) of this rule, a party may obtain discovery of documents and tangible things otherwise discoverable under subdivision (b)(1) of this rule and prepared in anticipation of litigation or for trial by or for another party or by or for that other party's representative (including the other party's attorney, consultant, surety, indemnitor, insurer, or agent) only upon a showing that the party seeking discovery has substantial need of the materials in the preparation of the party's case and that the party is unable without undue hardship to obtain the substantial equivalent of the materials by other means. In ordering discovery of such materials when the required showing has been made, the court shall protect against disclosure of the mental impressions, conclusions, opinions, or legal theories of an attorney or other representative of a party concerning the litigation.

A party may obtain without the required showing a statement concerning the action or its subject matter previously made by that party. Upon request, a person not a party may obtain without the required showing a statement concerning the action or its subject matter previously made by that person. If the request is refused, the person may move for a court order. The provisions of Rule 37(a)(4) apply to the award of expenses incurred in relation to the motion. For purposes of this paragraph, a statement previously made is (A) a written statement signed or otherwise adopted or approved by the person making it, or (B) a stenographic, mechanical, electrical, or other recording, or a transcription thereof, which is a substantially verbatim recital of an oral statement by the person making it and contemporaneously recorded.

(4) Trial Preparation: Experts.



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(A) A party may depose any person who has been identified as an expert whose opinions may be presented at trial. If a report from the expert is required under subdivision (a)(2)(B), the deposition shall not be conducted until after the report is provided.

(B) A party may, through interrogatories or by deposition, discover facts known or opinions held by an expert who has been retained or specially employed by another party in anticipation of litigation or preparation for trial and who is not expected to be called as a witness at trial, only as provided in Rule 35(b) or upon a showing of exceptional circumstances under which it is impracticable for the party seeking discovery to obtain facts or opinions on the same subject by other means.

(C) Unless manifest injustice would result, (i) the court shall require that the party seeking discovery pay the expert a reasonable fee for time spent in responding to discovery under this subdivision; and (ii) with respect to discovery obtained under subdivision (b)(4)(B) of this rule the court shall require the party seeking discovery to pay the other party a fair portion of the fees and expenses reasonably incurred by the latter party in obtaining facts and opinions from the expert.

(5) Claims of Privilege or Protection of Trial Preparation Materials.

When a party withholds information otherwise discoverable under these rules by claiming that it is privileged or subject to protection as trial preparation material, the party shall make the claim expressly and shall describe the nature of the documents, communications, or things not produced or disclosed in a manner that, without revealing information itself privileged or protected, will enable other parties to assess the applicability of the privilege or



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protection.

(c) PROTECTIVE ORDERS.

Upon motion by a party or by the person from whom discovery is sought, accompanied by a certification that the movant has in good faith conferred or attempted to confer with other affected parties in an effort to resolve the dispute without court action, and for good cause shown, the court in which the action is pending or alternatively, on matters relating to a deposition, the court in the district where the deposition is to be taken may make any order which justice requires to protect a party or person from annoyance, embarrassment, oppression, or undue burden or expense, including one or more of the following:

- (1) that the disclosure or discovery not be had;
- (2) that the disclosure or discovery may be had only on specified terms and conditions, including a designation of the time or place;
- (3) that the discovery may be had only by a method of discovery other than that selected by the party seeking discovery;
- (4) that certain matters not be inquired into, or that the scope of the disclosure or discovery be limited to certain matters;
- (5) that discovery be conducted with no one present except persons designated by the court;
- (6) that a deposition, after being sealed, be opened only by order of the court;
- (7) that a trade secret or other confidential research, development, or commercial information not be revealed or be revealed only in a designated way; and
- (8) that the parties simultaneously file specified documents or information enclosed in sealed envelopes to be opened as directed by the court.

If the motion for a protective order is denied in whole or in part, the court may, on such terms and



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conditions as are just, order that any party or other person provide or permit discovery. The provisions of Rule 37(a)(4) apply to the award of expenses incurred in relation to the motion.

(d) TIMING AND SEQUENCE OF DISCOVERY.

Except in categories of proceedings exempted from initial disclosure under Rule 26(a)(1)(E), or when authorized under these rules or by order or agreement of the parties, a party may not seek discovery from any source before the parties have conferred as required by Rule 26(f). Unless the court upon motion, for the convenience of parties and witnesses and in the interests of justice, orders otherwise, methods of discovery may be used in any sequence, and the fact that a party is conducting discovery, whether by deposition or otherwise, does not operate to delay any other party's discovery.

(e) SUPPLEMENTATION OF DISCLOSURES AND RESPONSES.

A party who has made a disclosure under subdivision (a) or responded to a request for discovery with a disclosure or response is under a duty to supplement or correct the disclosure or response to include information thereafter acquired if ordered by the court or in the following circumstances:

(1) A party is under a duty to supplement at appropriate intervals its disclosures under subdivision (a) if the party learns that in some material respect the information disclosed is incomplete or incorrect and if the additional or corrective information has not otherwise been made known to the other parties during the discovery process or in writing. With respect to testimony of an expert from whom a report is required under subdivision (a)(2)(B) the duty extends both to information contained in the report and to information provided through a deposition of the expert, and any additions or other changes to this information shall be disclosed by the party at the time the party's disclosures under Rule 26(a)(3) are due.

(2) A party is under a duty seasonably to amend a prior response to an interrogatory, request for



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production, or request for admission if the party learns that the response is in some material respect incomplete or incorrect and if the additional or corrective information has not otherwise been made known to the other parties during the discovery process or in writing.

(f) MEETING OF PARTIES; PLANNING FOR DISCOVERY.

Except in categories of proceedings exempted from initial disclosure under Rule 26(a)(1)(E) or when otherwise ordered, the parties must, as soon as practicable and in any event at least 21 days before a scheduling conference is held or a scheduling order is due under Rule 16(b), confer to consider the nature and basis of their claims and defenses and the possibilities for a prompt settlement or resolution of the case, to make or arrange for the disclosures required by Rule 26(a)(1), and to develop a proposed discovery plan that indicates the parties' views and proposals concerning:

- (1) what changes should be made in the timing, form, or requirement for disclosures under Rule 26(a), including a statement as to when disclosures under Rule 26(a)(1) were made or will be made;
- (2) the subjects on which discovery may be needed, when discovery should be completed, and whether discovery should be conducted in phases or be limited to or focused upon particular issues;
- (3) what changes should be made in the limitations on discovery imposed under these rules or by local rule, and what other limitations should be imposed; and
- (4) any other orders that should be entered by the court under Rule 26(c) or under Rule 16(b) and (c).



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The attorneys of record and all unrepresented parties that have appeared in the case are jointly responsible for arranging the conference, for attempting in good faith to agree on the proposed discovery plan, and for submitting to the court within 14 days after the conference a written report outlining the plan. A court may order that the parties or attorneys attend the conference in person. If necessary to comply with its expedited schedule for Rule 16(b) conferences, a court may by local rule (i) require that the conference between the parties occur fewer than 21 days before the scheduling conference is held or a scheduling order is due under Rule 16(b), and (ii) require that the written report outlining the discovery plan be filed fewer than 14 days after the conference between the parties, or excuse the parties from submitting a written report and permit them to report orally on their discovery plan at the Rule 16(b) conference.

(g) SIGNING OF DISCLOSURES, DISCOVERY REQUESTS, RESPONSES, AND OBJECTIONS.

(1) Every disclosure made pursuant to subdivision (a)(1) or subdivision (a)(3) shall be signed by at least one attorney of record in the attorney's individual name, whose address shall be stated. An unrepresented party shall sign the disclosure and state the party's address. The signature of the attorney or party constitutes a certification that to the best of the signer's knowledge, information, and belief, formed after a reasonable inquiry, the disclosure is complete and correct as of the time it is made.

(2) Every discovery request, response, or objection made by a party represented by an attorney shall be signed by at least one attorney of record in the attorney's individual name, whose address shall be stated. An unrepresented party shall sign the request, response, or objection and state the party's address. The signature of the attorney or party constitutes a certification that to the best of the signer's knowledge, information, and belief, formed after a reasonable inquiry, the request, response, or objection is:



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(A) consistent with these rules and warranted by existing law or a good faith

argument for the extension, modification, or reversal of existing law;

(B) not interposed for any improper purpose, such as to harass or to cause

unnecessary delay or needless increase in the cost of litigation; and

(C) not unreasonable or unduly burdensome or expensive, given the needs of the

case, the discovery already had in the case, the amount in controversy, and

the importance of the issues at stake in the litigation.

If a request, response, or objection is not signed, it shall be stricken unless it is signed

promptly after the omission is called to the attention of the party making the request,

response, or objection, and a party shall not be obligated to take any action with respect to it

until it is signed.

(3) If without substantial justification a certification is made in violation of the rule, the court, upon

motion or upon its own initiative, shall impose upon the person who made the certification

, the party on whose behalf the disclosure, request, response, or objection is made, or both, an

appropriate sanction, which may include an order to pay the amount of the reasonable

expenses incurred because of the violation, including a reasonable attorney's fee.

HISTORY: (Amended Mar. 19, 1948; July 1, 1963; July 1, 1966; July 1, 1970; Aug. 1, 1980; Aug. 1, 1983; Aug. 1, 1987; Dec. 1, 1993)



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**ATTACHMENT B –
THE DAUBERT DECISION- SYLLABUS**



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DAUBERT et ux., individually and as guardians ad litem for DAUBERT, et al. v.
MERRELL DOW PHARMACEUTICALS, INC.

Certiorari to the United States Court of Appeals for the Ninth Circuit

No. 92-102. Argued March 30, 1993 -- Decided June 28, 1993

Petitioners, two minor children and their parents, alleged in their suit against respondent that the children's serious birth defects had been caused by the mothers' prenatal ingestion of Bendectin, a prescription drug marketed by respondent. The District Court granted respondent summary judgment based on a well credentialed expert's affidavit concluding, upon reviewing the extensive published scientific literature on the subject, that maternal use of Bendectin has not been shown to be a risk factor for human birth defects. Although petitioners had responded with the testimony of eight other well credentialed experts, who based their conclusion that Bendectin can cause birth defects on animal studies, chemical structure analyses, and the unpublished "reanalysis" of previously published human statistical studies, the court determined that this evidence did not meet the applicable "general acceptance" standard for the admission of expert testimony. The Court of Appeals agreed and affirmed, citing *Frye v. United States*, 54 App. D. C. 46, 47, 293 F. 1013, 1014, for the rule that expert opinion based on a scientific technique is inadmissible unless the technique is "generally accepted" as reliable in the relevant scientific community.

Held: The Federal Rules of Evidence, not *Frye*, provide the standard for admitting expert scientific testimony in a federal trial. Pp. 4-17.

(a) *Frye*'s "general acceptance" test was superseded by the Rules' adoption. The Rules occupy the field, *United States v. Abel*, 469 U.S. 45, 49, and, although the common law of evidence may serve as an aid to their application, *id.*, at 51-52, respondent's assertion that they somehow assimilated *Frye* is unconvincing. Nothing in the Rules as a whole or in the text and drafting history of Rule 702, which specifically governs expert testimony, gives any indication that "general acceptance" is a necessary precondition to the admissibility of scientific evidence. Moreover, such a rigid standard would be at odds with the Rules' liberal thrust and their general approach of relaxing the traditional



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barriers to "opinion" testimony. Pp. 4-8.

(b) The Rules--especially Rule 702--place appropriate limits on the admissibility of purportedly scientific evidence by assigning to the trial judge the task of ensuring that an expert's testimony both rests on a reliable foundation and is relevant to the task at hand. The reliability standard is established by Rule 702's requirement that an expert's testimony pertain to "scientific . . . knowledge," since the adjective "scientific" implies a grounding in science's methods and procedures, while the word "knowledge" connotes a body of known facts or of ideas inferred from such facts or accepted as true on good grounds. The Rule's requirement that the testimony "assist the trier of fact to understand the evidence or to determine a fact in issue" goes primarily to relevance by demanding a valid scientific connection to the pertinent inquiry as a precondition to admissibility. Pp. 9-12.

(c) Faced with a proffer of expert scientific testimony under Rule 702, the trial judge, pursuant to Rule 104(a), must make a preliminary assessment of whether the testimony's underlying reasoning or methodology is scientifically valid and properly can be applied to the facts at issue. Many considerations will bear on the inquiry, including whether the theory or technique in question can be (and has been) tested, whether it has been subjected to peer review and publication, its known or potential error rate, and the existence and maintenance of standards controlling its operation, and whether it has attracted widespread acceptance within a relevant scientific community. The inquiry is a flexible one, and its focus must be solely on principles and methodology, not on the conclusions that they generate. Throughout, the judge should also be mindful of other applicable Rules. Pp. 12-15.

(d) Cross-examination, presentation of contrary evidence, and careful instruction on the burden of proof, rather than wholesale exclusion under an uncompromising "general acceptance" standard, is the appropriate means by which evidence based on valid principles may be challenged. That even limited screening by the trial judge, on occasion, will prevent the jury from hearing of authentic scientific breakthroughs is simply a consequence of the fact that the Rules are not designed to seek cosmic understanding but, rather, to resolve legal disputes. Pp. 15-17.

951 F. 2d 1128, vacated and remanded.

Blackmun, J., delivered the opinion for a unanimous Court with respect to Parts I and II-A, and the opinion of the Court with respect to Parts II-B, II-C, III, and IV, in which White, O'Connor, Scalia, Kennedy, Souter, and Thomas, JJ., joined. Rehnquist, C. J., filed an opinion concurring in part and dissenting in part, in which Stevens, J., joined.