The Foundation of Extrapolation Evidence

The liberal use of “extrapolation evidence” by plaintiffs’ experts in construction defect cases creates the risk that juries may be swayed by “junk science” rather than the merits of a particular case. While there is no well-accepted definition of extrapolation evidence in the law, it is generally understood to mean a type of circumstantial evidence whereby an inference is based on known facts and observations. See Ronald M. Sandgrund & Scott F. Sullan, Another Perspective on Extrapolation Evidence, 7-4 Mealey’s Litig. Rep.: Constr. Defects 18 (May 2006) (examining extrapolation evidence from a plaintiff’s perspective and defining extrapolation evidence as noted above). While the use of extrapolation evidence is accepted practice in many contexts, the potential for plaintiff’s experts to manipulate this type of evidence exists, particularly in the context of construction defect cases.

A common use of extrapolation evidence in the construction law context is for an expert to opine that damage to a structure is widespread, based on the presence of damage in an isolated part of the structure. For example, in one recent case handled by the authors, the plaintiff’s expert opined that, even though only two invasive cuts were conducted, extensive damage in a residential structure existed and a complete renovation was required. The question is, to what extent, if at all, this type of leap in reasoning is permissible.

There is no per se rule that applies across jurisdictions regarding the admissibility of expert testimony utilizing extrapolation evidence in construction defect cases. Instead, the admissibility of extrapolation evidence appears to be determined on a case-by-case basis, applying the principles set forth under the general framework for analysis of the admissibility of expert testimony applicable in the relevant jurisdiction. An examination of the relatively sparse case law directly addressing this issue reveals, however, a consistent concern from the courts about the logical gaps that often exist between the established evidence and the conclusions reached by experts extrapolating from that evidence.

Recognize statistically insignificant samples and their susceptibility to exclusion.

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These logical gaps create serious questions about the reliability of the methodologies employed by those experts opining as to the extent of damage based on review of a minimal sampling.

The Supreme Court of the United States, in a case utilizing the Daubert standard for expert testimony, expressed in general terms the limitations of using extrapolation evidence:

Trained experts commonly extrapolate from existing data. But nothing in either Daubert or the Federal Rules of Evidence requires a district court to admit opinion evidence that is connected to existing data only by the ipse dixit of the expert. A court may conclude that there is simply too great an analytical gap between the data and the opinion proffered. General Elec. Co. v. Joiner, 522 U.S. 136, 146 (1997). As noted in Joiner, courts that wrestle with questions about the admissibility of extrapolation evidence are particularly concerned with whether the analytical gap is too great under the jurisdiction’s applicable standards for admission of expert testimony. In doing so, courts have reached inconsistent conclusions, but the general principle that emerges from a review of the scant reported cases addressing the issue is that an expert must provide an appropriate foundation for the extrapolation to be reliable. The requirement for an appropriate foundation to establish reliability ensures that the expert’s opinion is “genuinely scientific.” Rosen v. Ciba-Geigy Corp., 78 F.3d 316, 318 (7th Cir. 1996). For extrapolation to be allowed, it appears that an expert must provide some scientific basis to verify the validity of the extrapolation. The defense-lawyer authors of Is Expert Extrapolation in Construction Defect Cases Sufficiently Reliable?, supra, argue that “courts generally do not permit extrapolation under circumstances in which a direct, rather than extrapolated, analysis is possible.” The plaintiff-lawyer authors of Another Perspective on Extrapolation Evidence, supra, argue in response that the common thread in cases allowing extrapolation is “simple practicality and economics.” However, none of the cases cited in these articles, nor any case ever handled by the authors or any reported case discovered by the authors, appear to stand for such broadly stated rules. Instead, it appears that the overriding concern of courts is that proper foundation is provided to ensure the reliability of the extrapolation testimony.

For example, in Ayala v. Pardee Const. Co., the plaintiff-homeowner Ayala urged the court to allow the expert who examined the plaintiff-homeowner Rochelle’s home to extrapolate damages to Ayala’s home based on inspection of the Rochelle home. Super. Ct. No. RIC297648, 2002 WL 31160551, at *11 (Cal. App. Sep. 30, 2002) (unpublished). Ayala argued that, “in a construction defect case involving mass-produced housing, expert testimony based on ‘a sufficient sampling of houses’ may be applied to all the other houses by ‘extrapolation.’” Id. Significantly, the court responded to this argument by denying admissibility of the extrapolation evidence, noting that the relevant inquiry was the reliability of the sample and stating:

But when is a sampling “sufficient”? On this record, we have no way of knowing whether the alleged defects in the Rochelles’ houses and the Ayalas’ houses were so similar as to make expert testimony regarding the latter unnecessary. And, as we have previously noted, the trial court could reasonably conclude that separate expert testimony was necessary. Id. In so ruling, the court implicitly held that the trial court could exercise its discretion to determine whether the extrapolation testimony was admissible based on the reliability of the evidence as determined by the sufficiency of the sample.

Similarly, in Harbor House Condominium v. Mass. Bay Insur. Co., 703 F. Supp. 1313, 1321 (N.D. Ill. 1988), the district court held that the plaintiff could not prove the extent of its damage by “extrapolating from the cost to repair past damage which is not the subject of the [present] dispute” because “without locating the [present] damage, the expert opinions are mere speculation.” Once again, the court’s paramount concern when addressing the admissibility of extrapolation evidence was the reliability of that evidence.

Cases decided in the class action context also are consistent with this view. For example, in Shuette v. Beazer Homes Holdings Corp., 124 F.3d 530, 542–43 (Nev. 2005), the court refused to grant class certification to homeowners who bought houses from the same developer building and selling homes in a particular subdivision, stating: “[a]s a practical matter, single-family residence constructional defect cases will rarely be appropriate for class action treatment… [C]lass actions involving real property are often “incompatible with the fundamental maxim that each parcel of land is unique…” Allowing class actions to proceed on issues, especially those of liability, that involve variables particular to “unique” parcels of land would require either an alteration of this principle or an extensive subclassification system that would effectively defeat the purpose of the class action altogether…[W]e recognize that, where specific characteristics of different land parcels are concerned, “these uniqueness factors weigh heavily in favor of requiring independent litigation of the liability to each parcel and its owner.” Similarly, in Hicks v. Kaufman & Broad Home Corp., 107 Cal. Rptr. 2d 761 (2001), the court found that class certification was inappropriate for the plaintiffs’ negligence claims because, under California law, negligence requires the proof of actual property damages, unlike warranty claims, which only require proof of the existence of a defect. Id. at 767–75. Therefore, the court held that the class could proceed with warranty claims because it was undisputed that the allegedly “inherently defective” material was used in all of the homes at issue. Id. at 773. On the other hand, the plaintiffs were not allowed to proceed on their negligence claims because “to recover under [negligence] theories of liability each class member would have to come forward and prove specific damage to her home (e.g., uneven floors, insect infesta-
tion, misaligned doors and windows), and that such damage was caused by cracks in the foundation, not some other agent.” *Id.* In other words, the court in *Hicks* held that the plaintiffs were not allowed to extrapolate their individualized property damage to support their negligence claim from the property damage suffered by others.

The theme of focusing on the reliability of extrapolation evidence to determine its admissibility also carries through even in cases where courts have allowed extrapolation evidence. For example, in *Washington Courte Condominium Ass’n v. Washington Golf Corp.*, 643 N.E.2d 199, 212 (Ill. App. Ct. 1994), the appellate court upheld a damages award of $1.7 million for damages caused by water infiltration based on an expert’s unchallenged extrapolation testimony that his firm had spent more than 1,900 hours examining the building and that “the sampling sizes created by his testing procedures formed a statistical basis with an accuracy of 99.3 percent, meaning that if he ‘opened up the entire building’, 99.3 percent of the building would be found just the way [he] described it.” This type of statistical analysis resulting in that level of accuracy, if backed by appropriate data, statistical models and other indicia of reliability, certainly would seem to be sufficient.

On the other hand, when the extrapolation testimony offered by experts is based on statistically insignificant or inaccurate data, the opinion may be found unreliable. In these cases of inadequate statistical support, the gatekeeping function of the courts necessitates the exclusion of such expert testimony. Cases outside the construction law context amply illustrate this point. For instance, in *Dunn v. Sandoz Pharmaceuticals Corp.*, the court barred the plaintiff’s expert witness from extrapolating on studies that were “statistically insignificant and inconclusive on causation due in part to a sample size that was inadequate.” 275 F. Supp. 2d 672, 681 (M.D.N.C. 2003). The court noted that unreliable scientific methodology, markedly small sample size and selective use of insignificant data were insufficient to support an opinion on whether the drug in question caused the plaintiff’s injury. *Id.* As *Dunn* demonstrates, allowing experts to extrapolate based on data that is insignificant in volume or specificity does not satisfy reliability standards required for admission, and may create an impermissible gap between the evidence presented and the opinion proffered.

A determination of statistical insignificance is not necessarily determinative, however. Courts may still admit extrapolation evidence where corroborating evidence verifies its validity. For example, in *Sentinel Mgmt. Co. v. Aetna Cas. & Surety Co.*, 615 N.W.2d 819 (Minn. 2000), the plaintiff’s expert testified that an entire 450-unit building was contaminated by asbestos fibers based on four positive dust samples from only five units. *Id.* at 825. However, the expert also relied on his visual inspection of the property, statements from the building managers that asbestos-containing fibers were used throughout all buildings managed by the plaintiff, and work orders indicating that the use and maintenance of the building resulted in activities that would have released the asbestos-containing fibers into the air to provide further support for his conclusion. *Id.* The Minnesota Supreme Court upheld the trial court’s admission of the expert’s testimony, noting that the expert’s conclusion was “based on much more” than the four positive samples. *Id.* at 824.

Similarly, the court in *Consolidated Electrical Distributors, Inc. v. Kirkham, Chaon & Kirkham, Inc.* held extrapolation evidence admissible where adequate supporting evidence was available, 95 Cal. Rptr. 673 (1971). There, the plaintiff was a supplier of electrical fixtures who alleged certain electrical fixtures had been delivered to and used by the defendants in a school building. *Id.* The court held that the testimony of the plaintiff’s employee was not deficient where the employee “extrapolated [the presence of the electrical fixtures at issue] on the basis of his physical sampling of the identical premises [based on blueprints].” *Id.* The court further noted that the employee’s failure to observe the materials being incorporated into the school building physically “[did] not in any way detract from the evidentiary force of his correlation between his physical inventory of the fixtures observed at the school after its completion and the purchase orders and invoices that were introduced into evidence.” *Id.*

Even though it appears that courts sometimes may allow expert testimony based on extrapolation evidence founded on insignificant statistical samples where adequate corroborating evidence is present, questions remain as to how much and what kind of corroborating support is necessary to justify admission of statistically unreliable extrapolation evidence. For example, in *Another Perspective on Extrapolation Evidence, supra*, the authors outline a scenario based on one of their prior cases in which a builder testifies that he instructed that all 400 windows throughout a 60-unit condominium complex be hung in a particular way, which resulted in the windows being hung upside down. The authors in *Another Perspective* suggest that “few courts would reject” expert testimony establishing the amount of damages for all 400 windows, even though the expert might have only inspected 10 of the windows, a statistically insignificant sample size, when viewed in conjunction with the custom and practice evidence. *Id.*

On the other hand, while courts may allow the extrapolation under the circumstances described above, the question is what if the corroborating evidence is less compelling, lacks credibility or is simply non-existent? Would a court allow evidence that the windows were hung upside-down in all of the 60-unit condominium based on a sampling of just 10 windows without the testimony that all of the windows were hung the same way? It certainly seems that a court would not.

In another example, a recent case handled by the authors, an expert opined that all of a particular home component had to be replaced after examining only ten of the 49 areas of the home where the component was contained. No corroborating evidence was offered, and the only evidence was that the components were all unique in their installations and manufacture. Should the expert testimony based on this extrapolation evidence be admitted based on this insignificant statistical sampling without any corroborating evidence? Again, it seems that it should not be.

As with many evidentiary issues, the difficulty in crafting a bright-line rule for extrapolation evidence is that many case-specific factors may affect the reliability of the evidence. However, in none of the cases addressing extrapolation cited above did the court address issues related to economic cost or availability of direct analysis, as suggested by the authors in the articles cited above. The courts instead centered their analysis on the...
reliability of the extrapolation testimony, as was expressly noted by the court in Ayala, supra. Therefore, the rule that emerges from these cases should be that, to be admissible, extrapolation evidence based on statistically insignificant sample sizes or other scientifically invalid sources must be supported by corroborating evidence to verify the reliability of the extrapolation.

A rule such as this necessarily requires a case-by-case analysis that may be applied as a two-prong test. First, is the extrapolation evidence based on a statistically valid sample size that results in a reliable conclusion? This may be a particularly difficult question to answer. For example, in Washington Courte Condo. Ass’n, supra, the sampling analysis had a “statistical basis with an accuracy of 99.3 percent.” This begs the question: what if the accuracy were lower? Is 90 percent enough to be reliable? 75 percent? 50 percent? At what level of accuracy would you need corroborating support?

Second, how much corroborating support, and what kind, is needed? Does it have to rise to the level of custom and practice evidence? Would the expert need independent knowledge of this corroborating evidence, as in Sentinel Mgmt. Co. where the expert made an independent inspection of the work orders and spoke directly to the building managers giving the relevant statements?

While none of these questions lend themselves to bright-line answers, it does seem that the analysis should be conducted on a sliding scale such that as statistical accuracy increases, the corroborating evidence needed to support admissibility would decrease. From a practical perspective, then, the most effective way to defend against a plaintiff seeking to introduce extrapolation evidence is to attack the reliability of the testimony by demonstrating that the sampling conducted is statistically insignificant or otherwise contrary to statistical reliability. Once it is established that the extrapolation lacks independent statistical reliability, the next step is to demonstrate that any corroborating support, if present, does not establish reliability.

Such a process is consistent with the requirements of Daubert, in which the Supreme Court of the United States noted that the admissibility of expert testimony should not depend upon any “definitive checklist or test” and emphasized the need for flexibility. While every state has not adopted the Daubert standard for admissibility, many have adopted it or a similar standard, and it is a fair representation of the type of law applicable in virtually every jurisdiction. A Daubert analysis commonly includes consideration of the following factors:

• Whether the theories and techniques employed by the scientific expert have been tested;
• Whether they have been subjected to peer review and publication;
• Whether the techniques employed by the expert have a known error rate;
• Whether they are subject to standards governing their application; and
• Whether the theories and techniques employed by the expert enjoy widespread acceptance.

Where extrapolation evidence is based upon statistically insignificant samples, then the factors listed above all weigh heavily against admission. However, as noted in Daubert, these factors are not absolutely determinative and the specific facts of a case must be considered when evaluating admissibility. In the case of extrapolation evidence, the lack of statistically significant sample sizes may be overcome by the existence of sufficient corroborating evidence. It is entirely consistent with Daubert’s requirement for flexibility that as statistical accuracy increases, the corroborating evidence needed to support admissibility would decrease. Indeed, it should be soundly within the purview of the court’s gatekeeping function to determine whether sufficient corroborating evidence exists to warrant admission of the extrapolation evidence.

In sum, an examination of court decisions from around the country suggests that the most likely successful defense to extrapolation evidence is to attack the lack of foundation frequently present where this type of evidence is presented. Extrapolation evidence provided by experts, who rely solely on statistically insignificant samples without corroborating evidence justifying the extrapolation, appears particularly susceptible to exclusion. When an expert attempts to extend his or her opinion beyond the area of direct observation and analysis, counsel should consider a motion to exclude under the applicable jurisdiction’s evidentiary rules.