I. INTRODUCTION

What is a toxic tort action? Toxic torts occur when a defendant causes a plaintiff, by his legal fault, damage to health or property by exposure to a substance: liquid, gas, or particulate. It is the damage resulting from invasion of a legally protected right caused by a poison.

Common counts in a plaintiff's petition in toxic tort are:

Negligence
Negligence per say (statutory violations of federal or state law)
Strict liability
Strict liability in the conduct of an ultrahazardous activity
Product liability
Assault and Battery
Infliction of Emotional Distress
Nuisance
Trespass
Exemplary or Punitive Damages

Traditional methods of proof tend to be insufficient for the plaintiff to meet his burden of proof with the trier of fact. Special experts and techniques are required in order to prove a toxic tort case. As trial lawyers have become more sophisticated in using the tools of safety engineering and in recognizing toxic exposure cases, drug poisoning cases, chemical insult cases, and organic brain injury cases, causation has become a livelier and more demanding battlefield for adversaries to test their skills. Because proof of causation can pose the most formidable task, requiring research in diverse scientific fields, from animal physiology to chemistry, it is important to define just what we mean by "causation". One court has opined:

> "A cause-effect relationship need not be clearly established by animal or epidemiological studies before a doctor can testify that, in his opinion, such a relationship exists. As long as the basic methodology employed to reach such a conclusion is sound, such as use of tissue samples, standard tests, and patient examinations, product's liability law does not preclude recovery until a 'statistically significant' number of people have been injured or until science has had the time and resources to complete sophisticated laboratory studies of the chemical. In a courtroom, the test for allowing a plaintiff to recover in a tort suit of this type is not scientific certainty by legal sufficiency." Ferebee v. Chevron Chemical Co., 736 F.2d 1529 (D.C. Cir. 1984).

II. DAUBERT OVERRULES FRYE: THE TRIUMPH OF METHODOLOGY OVER CONCLUSIONS

In 1923 a federal court of appeal held in Frye v. United States, 293 F 1013, that to be admissible, expert testimony must be "sufficiently established to have general

acceptance in the field to which it belongs". The court was interested in whether or not the expert's opinion was one generally held by others in its field.

Federal Rule of Evidence 702 holds:

> If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise.

Louisiana's Code of Evidence Article 702 is identical. The question for the court in Daubert v. Merrrel Dow Pharmaceuticals, Inc, 113 S.Ct. 278 (1993), was whether or not the federal rules of evidence supersede Frye, and would they overturn seventy (70) years of jurisprudence. The defendants in Daubert attempted to persuade the court that the Frye test survived the enactment of Federal Rule of Evidence 702 to require "general acceptance in the field" in order to be acceptable for presentation to the trier of fact.

In Daubert, plaintiffs sued to recover damages for malformations and birth defects related to ingestion of an anti-nausea drug, Bendectin. Defendant manufacturers moved for summary judgment on the ground that of the thirty of so published epidemiological studies covering over 100,000 people, none had found Bendectin to be a human teratogen. Plaintiffs, on the other hand, countered with an array of some eight experts in various fields who reached an opposite conclusion based on test tube studies, animal studies, studies of chemical structure and comparison with other known harmful teratogens as well as an analysis of the existing epidemiological studies.

The District Court relied on Frye and granted defendant's motion for summary judgement on the ground that the expert opinions, of the plaintiff's witnesses, were not based on peer reviewed, published, epidemiological data and were therefore not admissible to establish causation, since any other scientific studies except epidemiological data could not be submitted for jury consideration. The Ninth Circuit Court of Appeals affirmed.

The U. S. Supreme Court reversed and remanded finding that the admissibility of expert testimony is governed by Federal Rule of Evidence 702. The court held that requiring "general acceptance" as a condition of admissibility would "be at odds with the liberal thrust of federal rules and their general approach of relaxing the traditional barriers to opinion testimony". Unlike ordinary witnesses, experts must be permitted wide latitude to offer opinions including those that are not based on first hand knowledge or observation.

The court in Daubert stated:

> "The rules were designed to depend primarily upon lawyer - adversaries and sensible triers of fact to evaluate conflicts.

> Defendant expresses apprehension that abandonment of 'general acceptance' as the exclusive requirement for admission will result in a 'free-for-all' in which befuddled juries are confounded by absurd and irrational pseudo-scientific assertions. In this regard defendant seems to us to be overly pessimistic about the capabilities of the jury, and of the adversary system generally. Vigorous cross-examination, presentation of contrary evidence, and careful instruction on the burden of proof are the traditional and appropriate means of attacking shaky but admissible evidence... These conventional devices (including directed verdict and summary judgment) rather than wholesale exclusion under an uncompromising 'general acceptance' test are the appropriate safeguards where the basis of scientific testimony meets the standards of Rule 702."

The court did recognize that the trial judge has a role as gatekeeper in screening proffered scientific evidence for relevancy and reliability. Thus, as gatekeeper, the trial judge must determine if the subject of the testimony is "scientific knowledge" which is grounded in the methods and procedures of science and which is not subjective belief or unsupported speculation.

Scientific knowledge includes not only facts, but also ideas, inferred from known facts and derived by the scientific method from what is known. As the court noted, scientific knowledge did not have to be known to a "certainty":

> "Of course it would be unreasonable to conclude that the subject of scientific testimony must be 'known' to a certainty; arguably, there are no certainties in science."

Relevancy is determined using the two following factors: Testimony is relevant if it "assists the trier of fact to understand the evidence or to determine a fact in issue". Testimony is also relevant if it is "tied to the facts of the case".

Therefore, it can be seen that the focus of the Courts inquiry as gatekeeper must be not on the conclusions of the experts, but rather on his or her principles and methodology. "Pertinent evidence based on scientifically valid principles will satisfy those demands". The Daubert opinion establishes:

1. The Federal Rules are to be liberally construed for the admission of relevant evidence;

2. The Frye standard of general acceptance for the admissibility of scientific evidence is rejected; and

3. Although the court plays a "screening" or "gatekeeper" role in regard to scientific evidence, the primary method of testing such evidence is through conventional trial procedure such as cross-examination, presentation of contrary evidence and

directed verdict rather than denying a litigant an opportunity to present his case.

Furthermore, the court held that there are four factors which must be considered in determining whether the scientific methodology underlying an expert opinion is valid under Rule 702:

1. Whether the experts theory or technique will be (and has been) tested;

2. Whether the theory or technique has been subjected to peer review and publication;

3. What the known or potential "rate of error" is for any test or scientific technique that has been employed; and

4. The Frye standard of whether the technique is generally accepted in the scientific community.

The impact of Daubert affects every case in which expert opinion is necessary for a plaintiff or defendant to prove or defend his case. The Daubert "standard" or "test" will be used to analyze the admissibility of opinion testimony in all cases in which Federal Rule of Evidence 702 is invoked.

By recent opinion the Louisiana Supreme Court has noticed the Daubert opinion and adopted it as our law, State of Louisiana v. Foret, No. 93 K 0246 (11/30/93). Scientific evidence that was previously excluded under Frye, because it was not generally accepted, will now be admissible to the extent that it is scientifically valid. In Foret our Supreme Court remarked:

> ... Daubert refuses to precondition admissibility of expert scientific testimony solely upon on its "general acceptance" in the scientific community, and is also similar to Catanese in its reliance upon the evidence's admissibility provided that the trial court properly exercise its gatekeeping function in balancing the probative value of the evidence against its prejudicial effect it sets forth clearer guidelines as to how a trial court can determine the reliability of expert testimony in its consideration of the probative value aspect of the Catanese balancing test. The above-noted similarity between the federal and Louisiana rules on the admission of expert testimony, coupled with similar guidelines for the admissibility of expert scientific testimony pronounced by this court in Catanese, persuade this court to adopt Daubert's requirement that expert scientific testimony must rise to a threshold level of reliability in order to be admissible under La. C.E. art. 702. As we find the Daubert court's "observations" on what will help to determine this threshold level of reliability to be an effective guide, we shall adopt these "observations", as well.

III. CAUSATION

A. Legal Cause and Burden of Proof

As early as 1973, courts were holding, that if a defendant's product or conduct was "a" (not the) substantial factor in bringing about the injury complained of, the defendant's conduct was a proximate cause of the harm suffered by the plaintiff, e.g., Borell v. Fibreboard Paper Product, Inc., 493 F.2d 1076 (5th Cir. 1973) cert. denied, 95 S.Ct. 127 (1974). The importance of the holding is obvious: "a defendant's conduct is the cause of the event if it was a substantial factor in bringing it about". Therefore, the plaintiff's having had a series of events which may contribute in the overall calculus to the resulting illness at issue, will not in and of itself preclude recovery if, in fact, the exposure event is a substantial factor.

In the recent case of In re Manguno 961 F.2d 533 (5th Cir. 1992), the court addressed the defendant's attempt to bring forth a multitude of other causative factors for the plaintiff's malady other than his exposure to asbestos. The plaintiff's expert in Manguno testified that exposure to asbestos was one causal factor contributing to the plaintiff's lung disease. He testified that because the plaintiff smoked, that the two causes multiplied the risks of contracting cancer (the principle of synergy) but he knew of no scientific way to proportion the relative contributions of the two causes. The trial court incorrectly instructed the jury that "many factors or things may operate at the same time either independently or together to cause injury or damage, and in such case, each may be a cause, so long as it can reasonably be said that except for the asbestos exposure, the injury complained of would not have occurred". The author, Judge Politz, stated as follows:

> "[t]his argument misperceives Louisiana law. There can be more than one cause-in-fact making both wrongdoers liable. The long recognized principle of Louisiana law that causation is not defeated by the possibility that the injury would have happened without the defendant's involvement has never been relegated to only those cases in which a plaintiff first proves that the defendant only would have caused the harm. We have abjured but-for causation in the context of lung cancer injuries alleged to have been caused by asbestos. The Petes court ordered a new trial because a jury interrogatory wrongfully placed upon the plaintiff the burden of proving that the plaintiff's disease specifically resulted from asbestos. We distilled the controlling Louisiana law thusly: Many factors or things or the conduct of two or more persons or companies may operate at the same time either independently or together to cause injury and in such case may be a proximate cause."

In accord is the recent Louisiana Supreme Court decision reversing both the trial and appellate court Jack and Lillian Lasha v. Olin Corporation, et al, No. 93 - C -0044 (La. S. Ct.). Mr. Lasha worked for seven years as a truck driver for a transport company which made deliveries at the Olin Plant facility. He underwent annual employment physicals as required by the Department of Transportation; and although he was a

heavy smoker he was given a clean bill of health each year. He had experienced run of the mill upper respiratory problems such as bronchitis and sinusitis; however, he had never been disabled from these ailments and had never been diagnosed as having chronic bronchitis, clinical asthma or depression. However, after an exposure event February 6, 1988, he became disabled as a result of a chlorine gas escape, which released because of a malfunction at the plant. A co-worker with him that day was able to return to work. However, Mr. Lasha became disabled and had to seek treatment from various physicians for bronchitis, asthma and depression. The defendants argued that Mr. Lasha's health problems were not causally related to this incident but were attributable to his heavy smoking and an inherent tendency to hypochondria. Further, they contended that his depression resulted from negligent over- medication by Mr. Lasha's physicians.

The trial court concluded that the plaintiffs failed to prove the cause-in-fact element of their case because they did not demonstrate by a "reasonable medical certainty" that the chlorine exposure caused Mr. Lasha's injury or disability. Moreover, the trial court added that the over-medication of Mr. Lasha by his own doctors had exacerbated a tendency to depression and hypochondria which probably was disabling to him. The Supreme Court held as follows:

> "In Louisiana tort cases and other ordinary civil actions, the plaintiff, in general, has the burden of proving every essential element of his case, including the cause-in-fact of damage, by a preponderance of the evidence, not by some artificially created greater standard. Proof by direct or circumstantial evidence is sufficient to constitute a preponderance, when, taking the evidence as a whole, such proof shows that the fact or causation sought to be proved is more probable than not.
>
> When the term 'reasonable medical certainty' is used to described the measure of persuasion in a tort case, it produces harmful error in two respects. First, it places upon the plaintiff a higher degree of proof than is required in the ordinary civil case. To require plaintiff to prove defendant's negligence, for example, to a 'reasonable medical certainty' is to require him to prove it to such a degree as to leave no reasonable doubt, which is equivalent to saying that he must prove it beyond a reasonable doubt. Second, because the word 'medical' is susceptible of being construed as referring only to expert medical testimony, the use of the phrase 'reasonable medical certainty' tends to preclude the trier of the facts from considering evidence other than that of expert medical witnesses. While expert medical evidence is sometimes essential, it is self evident that, as a general rule, whether the defendant's fault was a cause in fact of plaintiff's personal injury or damage may be proved by other direct or circumstantial evidence."

Also in accord is Sharkey v. Sterling Drug Inc., 600 So.2d 701 (La. 1st Cir. 1992), which stated as follows:

> "It is well settled that for a plaintiff to succeed in a tort action, he must prove all the essential elements of his claim by a preponderance of the evidence. In cases where medical causation is at issue, medical certainty is not the standard. Our courts have recognized that 'medicine' is an inexact science at best but in courts of law we must be concerned not with concrete and irrefutable truths, but rather the proper distribution of liability based on the preponderance of the evidence."

In Wisner, 537 So.2d 740 (La. App. 1st Cir. 1988) @ 745 we further noted:

> "It is not unusual for medical experts to be unwilling to state unequivocally the cause of a certain malady. Likewise, we do not require that they do so, but only to provide their considered medical opinion on key issues from which the trier of fact makes its own determinations."

Sterling relies heavily on the fact that none of the experts at trial was able to state unequivocally that "Bayer aspirin" caused Sherry Fugler's Reye's Syndrome, and contends that the trial court erred in finding that the plaintiffs met their burden of proof regarding causation. As we have stated above, proof of causation to a medical certainty is not required. Indeed, even to date there exists no unequivocal proof by scientific standards that aspirin causes Reye's Syndrome. Therefore, proof of causation in this case rests largely on epidemiological or statistical studies. Proof of causation, based in part on epidemiological studies as the basis for expert opinion has been allowed in our courts.

B. Proving Medical Causation

In order to establish causation plaintiff must first prove that his exposure has been demonstrated to cause the type of injury suffered by the plaintiff. He then must prove that there is a reasonable possibility that his injury did in fact result from that exposure. See, Wisner, Supra; Sterling v. Velsicol Chemical Corp, 855 F.2d 1188 (6th Cir. 1988); Housley v. Cerise, 579 So.2d 973, 980 (La. 1991); and Lucas v. Insurance Company of North America, 342 So.2d 591 (La. 1977).

Causation calls more and more on proofs of human tolerances, health physics, mechanics of toxic exposure, toxicology and physiology, static and dynamic potentials of humans systems and micro biology, biochemistry, cellularbiology and industrial hygiene. This requires the toxic tort lawyer to be very familiar with these areas of expertise.

II. CAUSATION

1. Mechanics of causation

a. route of exposure, target organ(s)

b. toxic or hazardous agent, mechanism of action
c. dose related or cumulative or time of exposure
d. immune failure, cell alteration, allergy or antigen

2. Toxic properties

a. chemical or biochemical action
b. physiological responses
c. carcinogenicity, mutagenicity
d. susceptible populations

3. Issues

a. animal physiology and testing
b. quantitative chemical analysis
c. product testing for toxic decomposition
d. component analysis
e. antigen-antibody response
f. physiology of the immune system
g. fetal circulatory system and placental transfer
h. carcinogenicity of pesticides or drugs
i. life span of certain micro-organisms; and
j. statistical analysis of susceptible populations

4. Intervening conduct and victim conduct

III. TOOLS OF PROOF

1. Discovery

2. Industry Reports

3. Government Reports

4. Statistics

5. Experts

a. causation embraces several issues
b. not doctors. As to etiology of toxic insult, doctors are fact witnesses describing the result
c. may require several experts to cover relevant fields, such as:

Bioengineering Neuropathology
Trauma Mechanics Microbiology
Biochemistry Animal Physiology

Endocrinology	Histology
Toxicology	Pharmacology
Epidemiology	Physiology
Hematology	Pathology
Histopathology	Immunopathology
Neuroanatomy	Industrial Hygiene
Semantics	Linguistics
Health Physics	Chemical Engineering
Biostatistics	Human Factors
Radiologic Imaging	Neuropsychology
Genetics	Teratology

d. Expert may be consulted to perform testing, do research, prepare exemplars, and prepare demonstrations for courtroom

e. Expert may contact with other experts. The expert may also review reports or test results of other experts.

6. Treaters

IV. PUNITIVE DAMAGES

A. State Law

Louisiana provides for the imposition of punitive damages pursuant to statute. L.S.A.-C.C. Article 2315.3 provides, "In addition to general and special damages, exemplary damages may be awarded, if it is proved that plaintiff's injuries were caused by the defendant's wanton or reckless disregard for public safety in the storage, handling, or transportation of hazardous or toxic substances. As used in this article, the term hazardous or toxic substances shall not include electricity."

The only reported case involving the imposition of punitive damages by the statute is Chinigo v. Geismar Marine, Inc., 512 So.2d 487 (La. App. 1st Cir. 1987). This case involved a suit for compensatory and exemplary damages by a police officer against the owner of a chemical tank truck. The tank truck was hauling a hazardous chemical, styrene monomer. The tank truck leaked the chemical and while investigating the leak the police officer was overcome by toxic fumes. The sheriff's deputy was off work for approximately three weeks and had medical expenses of about $1,000.00. The court of appeal allowed the jury award of $20,000.00 for general damages for pain and suffering, mental anguish and distress and affirmed a 5 to 1 ratio of $100,000.00 for punitive damages.

In Griffin v. Tenneco Oil Co., 531 So.2d 498 (La. App. 4th Cir.), the court wrote

> "... It seems appropriate at this point to consider the meaning of these terms (wanton or reckless disregard for the public safety). In Cates v. Beauregard Electric Cooperative, Inc., 316 So.2d 907 (La. App. 3rd Cir.

1975) the following helpful discussion is found at 916: The terms 'willful'", 'wanton', and 'reckless'" have been applied to that degree of fault which lies between intent to do wrong, and the mere reasonable risk of harm involved in ordinary negligence cases. Their terms apply to conduct which is still merely negligent, rather than actually intended to do harm, but which is so far from a proper state of mind that it is treated in many respects as if harm was intended. The usual meaning assigned to the terms is that the actor has intentionally done an act of unreasonable character in reckless disregard of the risk known to him, or so obvious that he must be taken to have been aware of it, and so great as to make it highly probable that harm would follow. It usually is accompanied by a conscious indifference to consequences, amounting almost to a willingness that harm should follow."

This interpretation of wanton or reckless disregard has been expanded in the recent case of Tillman v. CSX Transportation Company, 617 So.2d 46 (La. App 4th Cir. 1993), which comments:

> "In the instant case, the statute does not say that the injury must have been caused by the exposure to a toxic substance, but that it must have been caused by the defendant's reckless conduct in handling a toxic substance. We therefore disagree with defendant's contention that the applicability of punitive damages is a question of law. Although this accident caused no damages from hazardous or toxic substances, we conclude that a speeding train carrying hazardous or toxic substance is the type of conduct that the statute was designed to protect against. The finder of fact should therefore be given the opportunity to decide whether the defendant's conduct in this instance deserves punitive damages."

B. Federal Law

Three cases have recently defined the constitutional parameters on punitive damages.

Browning-Ferris Industries v. Kelco Disposal Inc., 109 S.Ct. 2909 (1989). Kelco Disposal filed suit against BFI in Federal District Court charging BFI with anti-trust violations and with interfering with Kelco's contractual relations in violation of Vermont tort law. A jury found BFI liable on both counts, and awarded Kelco, in addition to $51,146.00 in compensatory damages $6 million dollars in punitive damages on the state law claim. Held:

> The excessive fines clause of the Eight Amendment does not apply to punitive damages awards in cases between private parties; it does not constrain such an award when the government neither has prosecuted the action nor has any right to recover a share of the damages awarded.

In case of Pacific Mutual Life Insurance Company v. Haslip, 111 S.Ct. 1032 (1991), respondent's health insurance lapsed when Ruffin, an agent for the petitioner insurance company, misappropriated premiums. Haslip filed an action for damages in state court claiming fraud by Ruffin and seeking to hold his employer Pacific Mutual Life Insurance Company liable under respondeat superior. The jury, among other findings returned a verdict for Haslip for over $1 million dollars against Pacific Mutual Life Insurance Company and agent Ruffin, which sum included a punitive damages award of more than four times the amount of compensatory damages. Held:

> The punitive damages award in this case did not violate the Due Process Clause of the Fourteenth Amendment. Further, holding Pacific Mutual responsible for Ruffin's acts did not violate substantive due process. Although a mathematical bright line cannot be drawn between the constitutionally acceptable and the constitutionally unacceptable that would fit every case, general concerns of reasonableness and adequate guidance of the court when the case is tried to a jury properly enter into the constitutional calculus. In this case the trial court's instructions placed reasonable constraints on the exercise of the jury's discretion by expressly describing punitive damages purposes of retribution and deterrence, by requiring the jury to consider the character and degree of the particular wrong and by explaining that the imposition of punitive damages was not compulsory. Further the trial court and appellate court conducted post verdict hearing and review which ensured that punitive damages were reasonable.

In the case of TXO Production Corporation v. Alliance Resources Corporation, 113 S.Ct. 2711 (1993), TXO sued Alliance Resources, to clear a purported cloud on Alliance's title to oil and gas rights on one thousand acres of West Virginia land; and Alliance successfully counter claimed for slander of title. The jury awarded Alliance $19,000.00 in compensatory damages, its costs for defending the TXO action and $10 million dollars in punitive damages. West Virginia's highest court upheld the punitive award declaring TXO's lawsuit a "frivolous declaratory judgment action" and the U.S. Supreme Court held:

> Despite the dramatic disparity between the $10 million dollar punitive and the compensatory award with the punitive award five hundred twenty-six times the compensatory verdict, the punitive award did not violate the Due Process Clause of the Fourteenth Amendment as interpreted in Pacific Mutual Life Insurance Company v. Haslip, in view of the potential harm and losses Alliance would have suffered if TXO had succeeded in its "illicit scheme". The court recognized that punitive damages are the result of many "sometimes intangible" factors and rejected the so called "doctrine of comparable verdicts" test, a test that measures and compares the size of awards in similar cases.

V. RECENT CASES OF INTEREST

In Gauthier v. O'Brien, 618 So.2d 825 (La. 1993), a passenger, injured in a truck driven by her employer, brought action against the owner of the tractor and its driver which collided with the truck. The Supreme Court held that employer's fault must be assessed in order to appropriately assess the third party tortfeasor's fault; and the court, after the jury returns its verdict, should utilize a ratio approach under which the court disregards the proportion of fault assessed to the employer and reallocate the proportion of fault on all other blame worthy parties. This case overruled Guidry v. Frank Guidry Oil Company, 579 So.2d 947 (La. 1991) and Melton v. General Electric Company, Inc., 579 So.2d 448 (La. 1991).

Touchard v. Williams, 617 So.2d 885 (La. 1993), determined whether Louisiana Civil Code Article 2324(B) imposes solidary liability on joint tortfeasors only when the victim cannot collect at least fifty percent of his recoverable damages or whether the article imposes solidary liability on joint tortfeasors subject to a cap of fifty percent. Held:

> The article was intended to provide a cap on solidarity among joint tortfeasors of fifty percent rather than to create conditional solidarity among joint tortfeasors. The defendants in this case must be cast solidarily for fifty percent of the plaintiff's recoverable damages.

Lambert v. U.S. F. & G. Company, Louisiana Supreme Court Number 93-CC-2043 (11/19/93). This case determined whether or not the 1987 amendment to Civil Code Article 2324 and the court's decision in Gauthier, supra changed the court's holding of Weber v. Charity Hospital of Louisiana at New Orleans, 475 So.2d 1047 (La. 1985). In Weber it was held that the original tortfeasor may be liable not only for the injuries he directly causes but also for the tort victim's additional suffering caused by inappropriate medical treatment by the health care provider who treats the initial injuries. Held:

> The admendment to Civil Code Article 2324 does not dictate a change in the obligation of the original tortfeasor in a Weber-like situation.