Lawrence C. Goeb, et al., petitioners, Appellants,
vs.
Timothy Tharaldson, d/b/a Duluth Quality Pest Control,Respondent, Dow Chemical Company, d/b/a DowElanco, Respondent, Elliot Silberman, plaintiff intervenor, Respondent.

CX-98-2275

STATE OF MINNESOTA IN SUPREME COURT

Filed: August 17, 2000

Court of Appeals Office of Appellate Courts

SYLLABUS

1. The Frye-Mack standard for admissibility of scientific evidence, requiring novel scientific evidence to be both generally accepted and reliable, remains the standard in Minnesota.

2. The district court did not abuse its discretion in excluding the expert testimony as unreliable where the experts did not eliminate other potential causes of the claimed illnesses, did not review pre- or post-exposure medical records, or otherwise demonstrate the reliability of their opinions that exposure to an insecticide caused permanent illnesses.

3. Claims of inadequate warnings and instructions on the label of an insecticide are preempted by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), 7 U.S.C. 136 (1994).

4. Claims of negligent misrepresentation and negligent testing are not preempted by FIFRA.

5. Claims not pleaded or raised at the district court generally may not be raised on appeal.

Affirmed.

Heard, considered, and decided by the court en banc.

Blatz, C.J.

OPINION

BLATZ, Chief Justice.

Appellants Lawrence and Diane Goeb brought this action against Respondents Timothy Tharaldson d/b/a Duluth Quality Pest Control (Tharaldson), and Dow Chemical Company, d/b/a DowElanco (Dow), alleging that they and their son were permanently injured by their exposure to the insecticide Dursban. Dow moved to exclude several of appellants' expert witnesses, and moved for summary judgment as to the issue of medical causation. In granting the motions, the district court excluded appellants' experts because they used methodology that was not generally accepted under Frye v. United States, 293 F. 1013 (D.C. Cir. 1923), nor reliable under either our decision in State v. Mack, 292 N.W.2d 764, 768-69, 772 (Minn. 1980), or the United States Supreme Court decision in Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579, 587 (1993). Because without these experts appellants could not prove their exposure to Dursban caused their claimed illnesses, the district court granted Dow summary judgment. The Minnesota Court of Appeals affirmed. We also affirm, holding that Frye-Mack is the standard to be used to determine the admissibility of novel scientific evidence, and that the district court did not abuse its discretion in excluding appellants' expert testimony for lack of reliability under the Mack prong. In addition, we affirm the grant of partial summary judgment to Dow on appellants' claims of inadequate warnings and instructions on the Dursban label because those claims are preempted by federal law.

On March 31, 1990, respondent Tharaldson applied various insecticides to control an ant infestation at an

uninhabited rental home owned by Intervenor Elliot Silberman. One of the insecticides was Dursban, which is manufactured by Dow and contains the active ingredient chlorpyrifos.(FN1) At noon on Monday, April 2, 1990, appellants arrived at the house to begin the process of moving in. When Lawrence opened the door, he immediately noticed "a strong pungent, chemical smell" that caused his nose and throat to burn. Silberman had told appellants they might notice an odor and to open the doors and windows to get rid of it. He also told appellants they would find a light dust throughout the house that would need to be cleaned up with soap and water. The appellants did as he instructed, and began cleaning the house in preparation for their move later that week.

At about 10 p.m. that night, Diane called Lawrence at work. She told him that she had a bad headache, diarrhea, and nausea, and was concerned her symptoms might be related to the chemical odor in the house. Lawrence contacted Tharaldson within a day or two and asked whether the insecticides applied in the house could be making Diane ill. Tharaldson told Lawrence that he did not think any of the insecticides he used should be causing Diane's problems. Tharaldson called Dow to verify what he had told appellants, and Dow agreed that appellants should not be having any problems due to the Dursban. Lawrence then contacted Dow directly and was also reassured by a Dow representative that Dursban should not be causing Diane's symptoms. The Dow representative encouraged appellants to continue airing out the house to rid it of the chemical odor.

Appellants began living in the house on Thursday, April 5, 1990, even though the odor persisted. Lawrence continued to experience a burning sensation in his throat. A week later, he noticed that his sinuses were irritated and that he had a nasal discharge. After several weeks of living in the house, Lawrence began to feel "light-headed, confused, very forgetful, off balance, uncoordinated," noticed he had a "terrible memory, [and was] sometimes incoherent," and had difficulty swallowing, a sore throat, joint pain, muscle weakness, acne, and a ringing sensation in his ears. Diane still experienced headaches, nausea, diarrhea, and intestinal cramping, and their son had diarrhea and was listless. Lawrence called Dow a second time on April 25 and asked whether his symptoms could be attributed to the Dursban. This time the Dow representative recommended that Lawrence be seen by a doctor and have a cholinesterase test.(FN2) Lawrence went to the hospital emergency room the next day for testing, and Diane had the test a few days later. Both tests came back within expected normal ranges.(FN3) Notwithstanding these results, appellants immediately moved out of the house out of concern for their health. They also discarded clothing and other items of personal property that seemed to aggravate their symptoms. The testimony of others who entered the house following the insecticide application, including a neighbor, Silberman, and professional cleaners, echoed appellants' complaints about the strong chemical odor, burning sensation in the throat, and headaches.

On May 3, 1990, appellants contacted the St. Louis County Health Department, which initiated an investigation. On May 17, the health department epidemiologist and two Dow representatives went to the house and collected air samples to test for chlorpyrifos. They found air concentrations of 6.1 micrograms chlorpyrifos per cubic meter of air in the kitchen and 9.5 micrograms chlorpyrifos per cubic meter of air in the bedroom. An undated county health department memo summarizing the results of the investigation stated:

The National Academy of Sciences recommends a maximum concentration of 10 [micrograms chlorpyrifos per cubic meter of air] for continuous 24 hour exposure for the general population. Since [chlorpyrifos] normally clears quickly from the air following application, the Health Department feels it is likely that the actual concentration greatly exceeded this guideline the first few weeks following application. Given this, the dose/response illness pattern and the compatibility of the symptoms with organophosphate poisoning, the Health Department believes exposure to the [chlorpyrifos] is a reasonable explanation for the family's illness while living in the house.

The health department memo concluded, however, by stating that:

The department cannot attribute the [chlorpyrifos] exposure to the continuing illness experienced by the family since moving out of the house. Studies indicate that the half life for the chemical in the body is 27 hours. Given this, it does not seem possible that 15-20 minute daily periods in the house or contact with the items removed from the house would be sufficient to prevent ongoing declines in the tissue concentration of [chlorpyrifos] in the affected individuals.

In September 1990, air samples were again collected and analyzed at the house, this time by an independent researcher. The chlorpyrifos air concentrations reported at that time were 6.1 micrograms chlorpyrifos per cubic meter of air in the kitchen and 4.0 micrograms chlorpyrifos per cubic meter of air in the family room.(FN4)

Appellants commenced this action against Tharaldson in September 1992, alleging breach of express and implied warranties, negligent application of insecticides, and application of a defective and unreasonably unsafe product. Silberman also filed a complaint and his motion to intervene was granted in June 1993. In April 1994, appellants amended their complaint for the first time to add Dow as a defendant, and add claims for negligent manufacture, marketing, and sale, and failure to provide adequate warnings and instructions for use. The complaint was amended a second time in June 1994 to add a claim for misrepresentations by Dow. Dow moved for partial summary judgment, arguing that claims regarding warnings and label instructions were preempted by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), 7 U.S.C. 136 (1994), which requires manufacturers to register pesticides with the U.S. Environmental Protection Agency (EPA) and subjects them to specific regulations regarding the labeling and packaging of pesticides. In September 1994, the district court granted Dow partial summary judgment, ruling that the Goebs' claims of inadequate warnings and label instructions were preempted by FIFRA.

While the district court considered these and other issues, the parties proceeded with discovery. Appellants identified two expert witnesses who would testify that appellants have permanent damage to their health caused by their exposure to Dursban: Dr. Janette Sherman and Dr. Kaye Kilburn. Dr. Sherman, a medical doctor for over 30 years, is licensed to practice in four states and is board eligible in internal medicine. Prior to medical school, she worked as a chemist and biologist in several laboratories. She has lectured on toxicology and occupational and environmental medicine for over 20 years, and has authored numerous articles on pesticide toxicology, including ones in peer-reviewed journals that discuss chlorpyrifos. Recognized as an expert in her field, she has testified before Congress and acted as a consultant to the EPA on Dursban and other insecticides. Self-employed as a consultant, author, and lecturer, Dr. Sherman has testified as an expert witness in a number of cases.

Dr. Sherman examined appellants and took their medical history in November 1995. She concluded that the three Goeb family members have permanent brain damage and peripheral neuropathy caused by their exposure to Dursban. Dr. Sherman based this conclusion on her interviews with appellants, some pre-exposure medical records, the St. Louis County Health Department report, other relevant scientific research and literature, and her expertise. In her affidavit in response to Dow's motion to exclude her testimony, Dr. Sherman explained her reasoning and methodology as follows:

I have used standard scientific methodology in reaching my conclusions in the Goeb family case: medical and exposure histories, physical examinations, review of medical records, differential diagnosis in ruling out other likely causes of their illnesses, correlation with known adverse effects in other similarly exposed patients, and scientific, governmental and Dow Chemical Company reports.

I determined that the Goeb family was exposed to the chlorpyrifos in a manner which led to absorption into their bodies; I determined that, while I can never know all of the components of Dursban (solvents, emulsifiers, impurities) to which the Goeb family members were exposed, nor the total amount of exposure, the Goeb family members had prolonged exposure to a level of Dursban sufficient to cause their illnesses. A basic and useful tool in diagnosis and treatment of disease is the patient's medical history, whether obtained directly or from secondary sources. I examined, interviewed, and reviewed the medical records of Larry Goeb, Diane Goeb and Steven Goeb. Based upon my examination of the records, the relevant scientific research, and my own experience and research in the area, I have opined that the symptoms from which the Goeb family members presently suffer and from which they have suffered in the past, result from organophosphate poisoning caused by their exposure to Dursban, which unfortunately continued for some 30 days, long after the onset of their initial symptoms.

I have based their diagnoses upon my information regarding the Goebs' past and present medical, occupational, and environmental history; exposure to toxic agents; their lifestyle characteristics; family histories; present symptoms; past injuries, medical conditions, diseases, surgical procedures; and medical test results. The constellation of signs and symptoms which the Goeb family members developed, and the temporal relationship between exposure and the onset of symptoms are diagnostic of both acute and chronic exposure to organophosphate pesticides. The pattern of illness developed by the three family members is significant. Two are unrelated, and one is their child.

The data in this case support the scientific issues of consistency, temporality and biological coherence. The signs, symptoms, and illnesses developed by the Goeb Family members, following their exposure to the organophosphate pesticide Dursban, containing chlorpyrifos has biological coherence with Dursban's intended purpose to kill insect

species. The signs and symptoms are consistent with what is known about adverse effects in other persons and animals similarly exposed. The signs and symptoms show a temporal relationship between exposure and the development of illness. The facts are coherent with information available in scientific, governmental and corporate reports.

The second expert witness for appellants, Dr. Kilburn, is also renowned in his field and has published extensively in peer-reviewed medical journals on a variety of medical topics. Dr. Kilburn's expertise lies in neurotoxicological testing and its use in evaluating chemical exposure. A medical doctor for over 40 years, he is a Professor of Medicine at the University of Southern California School of Medicine. He has served on a number of medical advisory committees and is a member of the editorial boards of several medical journals. Dr. Kilburn has been accepted by federal and state courts as an expert in various fields including environmental toxicology.

Dr. Kilburn met with and examined appellants at his clinic in September 1996. Dr. Kilburn and his assistants performed a series of neurophysiological and neuropsychological tests on the appellants and the appellants completed toxic exposure questionnaires. In his affidavit, Dr. Kilburn stated:

I have reviewed the Goebs' medical records. I have taken a history from each of the Goebs and have administered questionnaires in order to rule out other possible causes of symptoms and impairments. Most abnormalities date from the chlorpyrifos exposure and do not associate with other possible causes. The differential diagnosis excludes spontaneous psychiatric and neurological diseases
* * *

* * * *

I am familiar with the scientific literature in relation to chlorpyrifos and the ability of chlorpyrifos to cause various types of injuries to the human nervous system. Conclusions can be reached in standard medical practice regarding the cause and effect relationship between exposure to chlorpyrifos and permanent damage to the central nervous system. It is my opinion as an expert in the fields of toxicology, internal medicine, pulmonology, and occupational health medicine that it is generally accepted in the medical community that the ability of chlorpyrifos to cause acute poisoning and of organophosphates to cause permanent paralysis - a most serious outcome, is well documented such that a physician may draw a conclusion regarding the cause and effect relationship when the physician has taken a history that shows chlorpyrifos exposure and the patient exhibits these symptoms and impairments on testing, on examination, or by history. This is especially true when the onset of symptoms is, as in this case, simultaneous with exposure.

Standard methodology to diagnose exposure to chlorpyrifos applies to this case. The first step is to determine whether the Goebs were exposed to Dursban. It is clear from the history that the Goeb family [was] exposed to Dursban. The second step is to assess the adverse health effects or toxicity of the agent including a review of relevant medical and scientific literature. The literature regarding adverse health effects is well established. The third step is to consider the dose response relationship of the agent. I have considered both the symptoms reported by the Goebs and the declarations of the St. Louis County Health Department
* * *.

Such a dose is fully capable of causing nausea, diarrhea, excessive salivation, dizziness, headaches, intestinal cramping, tingling on [tip] of tongue, lightheadedness, throat irritation, burning sensation in respiratory tract, difficulty breathing, lethargy, anxiety, incoordination, vomiting, and the constellation of other symptoms complained of by the Goeb family. These symptoms are well documented in the literature as being consistent with Dursban exposure as with exposure to other organophosphates.

Dow moved to exclude the expert testimony of Drs. Sherman and Kilburn, supporting its motion with the affidavits of three experts. One of Dow's experts explained that the generally accepted methodology to determine a cause and effect relationship between chemical exposure and illness involves a four-step process: (1) identification of the substance at issue and the duration and levels of exposure; (2) determination of the dose of the exposure received by the person; (3) analysis of relevant scientific and medical literature for valid proof of a causal relationship between a dose and a medical condition (dose-response); and (4) a differential diagnosis to rule out other possible causes. This expert also explained that in order to opine that appellants' exposure to Dursban in their home in April 1990 was the

cause of their permanent illnesses,(FN5) the level of Dursban to which they were exposed must be estimated. This exposure level, or dose, must then be compared to the no observed effect level (NOEL)(FN6) established for Dursban.

Dow contended that Drs. Sherman and Kilburn both acknowledged that they did not estimate the exposure levels in the home, and neither attempted to incorporate an exposure level into their analyses. Dow's experts stated that reliance on a temporal relationship between the date of exposure and the onset of symptoms is not a generally accepted or reliable methodology. Dow also argued that Drs. Sherman and Kilburn do not have the training, education, or experience in neurology, clinical neuropsychology, or toxicology to be qualified to testify as experts in those fields; that Dr. Kilburn's supporting research was conducted for litigation purposes and was funded by attorneys representing other plaintiffs; and that Dr. Sherman's expertise results solely from her work as a consultant in litigation.

Dow further noted that, contrary to the assertions in his affidavit, Dr. Kilburn testified during his deposition that he never requested or received appellants' medical records and thus had not reviewed them. In addition, Dr. Kilburn was unable to identify any published studies to support the premise underlying his conclusions that persons who had normal cholinesterase tests results during or shortly after exposure could in any event exhibit chronic illnesses attributable to the exposure six years later. Dow also noted that Dr. Sherman admitted in her deposition that she could not indicate the effect of the other insecticides applied in or around the house on appellants' claimed illnesses. Finally, contrary to her affidavit, Dr. Sherman admitted during her deposition that she did not review all of the appellants' pre-exposure medical records

In turn, appellants responded with evidence supporting Dr. Kilburn's and Dr. Sherman's qualifications. As to the exposure level concerns raised by Dow, appellants argued that: (1) it was Dow's initial misrepresentations that induced appellants to remain in the house and resulted in no air measurements being taken until six weeks after the initial application; (2) the testing in May 1990 indicated air concentrations in the house could have been above the NOEL; (3) the NOEL is not a reliable reference indicator in any event; (4) the persistent chemical odor in the home was evidence of misapplication and high initial exposure levels; (5) a methodology relying on medical history, the temporal relationship between exposure and symptoms, symptoms shown to be associated with exposure to that chemical, and the absence of confounding causes is generally accepted and reliable; and (6) the experts' statements in their affidavits that they used generally accepted and reliable methodology are sufficient to preclude their exclusion.

The district court granted Dow's motions to exclude the expert testimony, explaining that Dr. Kilburn's and Dr. Sherman's methodologies were not generally accepted and were unreliable in many respects. The district court found that neither expert discussed "dose response considerations," both relied "to an inappropriate degree on a temporal relationship between an unquantified exposure and claimed but unverified symptomatology," neither reviewed pre-exposure medical records of appellants, neither performed an appropriate differential diagnosis on appellants, and neither considered the NOEL concentration of chlorpyrifos. Further, according to the district court, the methodology the experts used was not generally recognized by the relevant medical and scientific communities. Finally, the district court ruled that "regardless whether the testimony of Drs. Sherman and Kilburn which has been proffered be evaluated as to its admissibility under the standards of Frye * * * or Daubert * * * their reliability is wanting." Because without the testimony of Drs. Sherman and Kilburn appellants could not establish a prima facie case that their illnesses were caused by their exposure to chlorpyrifos, the district court granted summary judgment to Dow as to medical causation and subsequently granted Dow summary judgment as to all appellants' claims.

Appellants sought review of their case in the court of appeals, claiming that the district court erred in deciding a number of issues. The court of appeals affirmed. See Goeb v. Tharaldson, No. CX-98-2275, 1999 WL 561956, at *2-*10 (Minn. App. Aug. 3, 1999). Appellants petitioned this court for review of the court of appeals' decision affirming the district court's exclusion of their expert witness testimony and holding that other claims based on inadequate warnings were either not pleaded or were preempted by FIFRA.

I.

This case presents us with the question of whether Minnesota should abandon the two-pronged standard for the admissibility of novel scientific evidence comprised of Frye v. United States, 293 F. 1013 (D.C. Cir. 1923), and State v. Mack, 292 N.W.2d 764, 768-69, 772 (Minn. 1980), in favor of the Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579, 587 (1993), standard set forth by the United States Supreme Court. Appellants urge us to adopt Daubert. In consideration of this issue, we first review the cases leading to the Frye-Mack standard.

The first prong of Frye-Mack, the Frye general acceptance standard, was conceived in a federal case addressing the admissibility of expert witness testimony arising from the results of an early lie-detector test. See Frye, 293 F. at 1013-14. The defendant, who had submitted to the test, attempted to verify the results by offering as an expert witness the scientist who had conducted the test. See id. at 1014. In affirming the district court's ruling excluding the lie detector test results, the Frye court explained that "while courts will go a long way in admitting expert testimony deduced from a well-recognized scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs." Id. As the lie-detector test at issue had "not yet gained such standing and scientific recognition among physiological and psychological authorities," expert testimony deduced from that test was not admissible. Id. From this opinion emerged the long-standing Frye standard for admissibility of novel scientific evidence requiring that the scientific principle or test about which an expert is to testify be generally accepted within the relevant scientific community. See Paul C. Giannelli, The Admissibility of Novel Scientific Evidence: Frye v. United States, a Half-Century Later, 80 Colum. L. Rev. 1197, 1205 (1980).

Minnesota adopted Frye in State v. Kolander, 236 Minn. 209, 221-22, 52 N.W.2d 458, 465 (1952). In Mack, 292 N.W.2d at 768-69, 772, we added an additional consideration to the Frye analysis in deciding that testimony developed through the aid of hypnosis was inadmissible. Although citing the Frye general acceptance standard, our primary concern in Mack was with the unreliability of memories produced while under hypnosis. See Mack, 292 N.W.2d at 768-69. As a result, the test for admissibility of novel scientific evidence in Minnesota developed into the two-prong Frye-Mack standard. First, a novel scientific technique must be generally accepted in the relevant scientific community, and second, the particular evidence derived from that test must have a foundation that is scientifically reliable. See State v. Anderson, 379 N.W.2d 70, 79 (Minn. 1985) (holding that graphology "is accorded a low measure of scientific reliability in predicting character or state of mind and is not generally accepted in the scientific fields of psychology and psychiatry"); see also State v. Jobe, 486 N.W.2d 407, 419-20 (Minn. 1992) (affirming the district court's admission of expert testimony based on DNA test results because the principles underlying forensic DNA testing are generally accepted, and the laboratory complied with the appropriate standards and controls, thus rendering the results legally reliable); State v. Moore, 458 N.W.2d 90, 97-98 (Minn. 1990) (affirming the district court's admission of expert testimony on blood spatter interpretation where the district court determined that the theory was generally accepted and the theory's application was legally reliable).

We have previously entertained a challenge to the Frye-Mack standard. In State v. Schwartz, 447 N.W.2d 422, 424-26 (Minn. 1989), a case concerning the admissibility of expert testimony based on DNA evidence, we considered whether to abandon Frye-Mack in favor of a standard for admission based solely on the Minnesota Rules of Evidence. In reaffirming our adherence to Frye-Mack, we explained that the Frye-Mack standard for admission "facilitates more objective and uniform rulings" by the courts while a standard based solely on the rules of evidence introduces an "undesired element of subjectivity * * * [into] evidentiary rulings." Schwartz, 447 N.W.2d at 424.

We now reconsider the Frye-Mack standard in light of the United States Supreme Court decision in Daubert, which considered the continued viability of Frye's general acceptance standard after the promulgation of the Federal Rules of Evidence. See Daubert, 509 U.S. at 585-89. The plaintiffs in Daubert were children and their parents who claimed the children's birth defects were caused by their mothers' ingestion of Bendectin, a drug prescribed to combat nausea during pregnancy. See id. at 582. Merrell Dow, the marketer of Bendectin, moved for summary judgment, supporting its motion with the affidavit of an expert who stated that no published study of patients had found Bendectin to cause malformations in fetuses. See id. The plaintiffs responded with the testimony of eight experts who concluded that Bendectin can cause birth defects, basing their conclusions upon animal-cell and live-animal studies, pharmacological studies, and reanalyses of previously published epidemiological studies. See id. at 583.

The federal district court granted Merrell Dow's motion for summary judgment because it found that the plaintiffs' scientific evidence did not meet the Frye "general acceptance" standard, and the Ninth Circuit affirmed. See Daubert, 509 U.S. at 583-84. Both courts concluded that an expert opinion not based on epidemiological evidence,

in light of the vast amount of data available, was not admissible. See id. Thus the animal-cell, live-animal, and pharmacological studies relied upon by the plaintiffs' experts could not raise a jury issue as to causation by themselves. See id. Further, the reanalyses of prior epidemiological studies were not generally accepted within the scientific community, as evidenced by the fact that they were unpublished, had not been subject to the peer review process, and were generated solely for use in the litigation. See id.

The Supreme Court held that the Frye general acceptance standard was superseded by the enactment of the Federal Rules of Evidence. See Daubert, 509 U.S. at 587. The Court noted that Rule 702 does not include a "general acceptance" prerequisite and the drafting history of the rule makes no mention of Frye.(FN7) See Daubert, 509 U.S. at 588. Further, the Court concluded that a "rigid `general acceptance' requirement would be at odds with the `liberal thrust' of the Federal Rules and their `general approach of relaxing the traditional barriers to `opinion' testimony.'" Id. (quoting Beech Aircraft Corp. v. Rainey, 488 U.S. 153, 169 (1988)). Accordingly, the Court held that the Frye general acceptance test should no longer be applied in federal trials. See Daubert, 509 U.S. at 589.

The Supreme Court then explained that even without Frye there are limitations on the admissibility of scientific evidence under the Federal Rules of Evidence. See Daubert, 509 U.S. at 589. The Court first looked to Rule 702 and explained that "scientific knowledge" requires an inference or assertion to be derived by scientific method and supported by appropriate validation. See Daubert, 509 U.S. at 589-90. Accordingly, scientific knowledge is subject to a standard of "evidentiary reliability." Id. at 590. The Court further explained that under Rule 702, evidence or testimony must assist the trier of fact to understand the evidence or determine a fact in issue, so scientific evidence must also be relevant. See Daubert, 509 U.S. at 591.

Next the Supreme Court made some "general observations" for trial judges faced with determining whether an expert's testimony involves scientific knowledge that will assist the trier of fact to understand or determine a fact in issue. See id at 592-93. The Court explained that there must first be a "preliminary assessment of whether the reasoning or methodology underlying the testimony is scientifically valid and of whether that reasoning or methodology properly can be applied to the facts in issue." Id. The Court identified several factors that, while not a "definitive checklist or test," might be helpful to the district court's inquiry. Id. at 593. They are:

1. whether the scientific knowledge "can be (and has been) tested;"
2. whether the "theory or technique has been subjected to peer review and publication;"
3. whether the technique has a "known or potential rate of error;" and
4. whether there is "general acceptance" of the scientific technique.

Id. at 593-94. The court emphasized that the Rule 702 inquiry is flexible, and added: "Its overarching subject is the scientific validity-and thus the evidentiary relevance and reliability-of the principles that underlie a proposed submission. The focus, of course, must be solely on principles and methodology, not on the conclusions that they generate." Daubert, 509 U.S. at 594-95.

Since Daubert, the Supreme Court has provided further guidance to the federal courts on the admissibility of expert evidence, first in General Electric Co. v. Joiner, 522 U.S. 136 (1997), and then in Kumho Tire Co. v. Carmichael, 526 U.S. 137 (1999). In Joiner, the Supreme Court held that the question of admissibility of expert testimony under Rule 702 is reviewable on appeal under an abuse of discretion standard. See Joiner, 522 U.S. at 142-43. The Court's recent decision in Kumho clarified that Daubert applies not only to scientific evidence, but also to expert testimony based on technical and other specialized knowledge under Rule 702. See Kumho, 526 U.S. at 147. In Kumho, the Court also reiterated that the Daubert factors are meant to be "helpful, not definitive," that the factors will not apply in every instance, and that the district courts have "considerable leeway in deciding in a particular case how to go about determining whether particular expert testimony is reliable." Kumho, 526 U.S. at 152.

With this background, we now turn to the question here, namely, whether we should follow the Supreme Court's reasoning in Daubert or adhere to our Frye-Mack standard for admissibility of evidence. Having previously considered and refused to abandon Frye-Mack, and given expectations for consistency in the law, we will only abandon Frye-Mack if the reasons for departing from that standard greatly outweigh those for retaining it. Cf. Johnson v. Chicago, Burlington & Quincy R.R. Co., 243 Minn. 58, 68, 66 N.W.2d 763, 770 (1954).

A number of arguments have been made for adopting Daubert in Minnesota. First, critics of the Frye general

acceptance standard claim that it may at times exclude cutting-edge but otherwise demonstrably reliable, probative evidence, and thus represents a more conservative approach to the admissibility of scientific evidence. See Giannelli, supra, at 1223-24; Lorie S. Gildea, Sifting the Dross: Expert Witness Testimony in Minnesota After the Daubert Trilogy, 26 Wm. Mitchell L. Rev. 93, 106 (2000). For example, the Frye standard might exclude a new, but reliable, methodology or test because of the inherent time lag between the development of a new scientific technique and its general acceptance in the field. See Giannelli, supra, at 1223. Also, a generally accepted theory or technique, although admissible, may not always be correct. See id. at 1224-25 (citing the general acceptance of the paraffin test to detect gunshot residue on skin in the 1930s, which was later found to be unreliable).

By comparison, because Daubert stresses a more liberal and flexible approach to the admission of scientific testimony, it has been viewed as relaxing the barriers to the admissibility of expert evidence. See, e.g., Joiner, 522 U.S. at 142 (noting that "the Federal Rules of Evidence allow district courts to admit a somewhat broader range of scientific testimony than would have been admissible under Frye"). However, in practice, Daubert does not necessarily make admissible expert evidence that was not admissible under Frye. One commentator has noted that "[t]he post-Daubert era can fairly be described as the period of `strict scrutiny' of science by non-scientifically trained judges." Lucinda M. Finley, Guarding the Gate to the Courthouse: How Trial Judges are Using Their Evidentiary Screening Role to Remake Tort Causation Rules, 49 DePaul L. Rev. 335, 341 (Winter 1999) (arguing that trial judges are raising the threshold of scientific proof needed to have expert causation testimony admitted).

The Frye general acceptance standard has been criticized for other reasons, most notably that it improperly defers to scientists the legal question of admissibility of scientific evidence. Some are concerned that Frye "`abdicates' judicial responsibility for determining admissibility to scientists uneducated in the law." State v. Coon, 974 P.2d 386, 392, 394-95 (Alaska 1999) (adopting Daubert). However, in repossessing the power to determine admissibility for the courts, Daubert takes from scientists and confers upon judges uneducated in science the authority to determine what is scientific. This approach, which necessitates that trial judges be "amateur scientists," has also been frequently criticized. See Daubert, 509 U.S. at 601 (Rehnquist, C.J., concurring in part, dissenting in part); see also Adina Schwartz, A "Dogma of Empiricism" Revisited: Daubert v. Merrell Dow Pharmaceuticals, Inc. and the Need to Resurrect the Philosophical Insight of Frye v. United States, 10 Harv. J.L. & Tech. 149, 158 (Winter 1997).

"[S]cientists often have vigorous and sincere disagreements as to what research methodology is proper, what should be accepted as sufficient proof for the existence of a `fact,' and whether information derived by a particular method can tell us anything useful about the subject under study." Daubert v. Merrell Dow Pharm., Inc., 43 F.3d 1311, 1316 (9th Cir. 1995) (Daubert II). Under Daubert, it is the responsibility of the judiciary "to resolve disputes among respected, well-credentialed scientists about matters squarely within their expertise, in areas where there is no scientific consensus as to what is and what is not `good science,' and occasionally to reject such expert testimony because it was not `derived by the scientific method.'" Daubert II, 43 F.3d at 1316; see also United States v. Hines, 55 F. Supp. 2d 62, 66 (D. Mass. 1999) (commenting that Frye "was perfectly suited to the court's competence," while Daubert requires "a judge, a notable generalist, to second guess a scientist"). A key assumption to this approach is that judges can not only resolve disputes among qualified scientists who have spent years immersed in their field of study, but can do so without also adopting the substantive positions of some scientists but not others.(FN8) See A. Schwartz, supra, at 158.

By comparison, the Frye general acceptance standard ensures that the persons most qualified to assess scientific validity of a technique have the determinative voice. See People v. Leahy, 882 P.2d 321, 325 (Cal. 1994). Although this approach is discounted by some as focusing on nose counting rather than on scientific validity, "[a]dmissibility can be based on scientific merit only if judges defer to practicing scientists' assessments of scientific merit." A. Schwartz, supra, at 194.

Another noted criticism of Frye is that it can be difficult to apply because it raises additional questions such as: (1) does the court look to general acceptance of a technique or the general acceptance of the underlying scientific principle; (2) who is the relevant scientific community; and (3) what is general acceptance - a majority, or a credible minority? See Giannelli, supra, at 1208-15. These types of criticisms, however, are not unique to Frye-Mack given that general acceptability is also one of the Daubert factors. Further, because the law is continuously evolving, answers to these questions will be set forth in case law as the issues properly present themselves. See Leahy, 882 P.2d at 329-30.

In addition to these criticisms of the Frye-Mack standard, it is also argued that the Supreme Court's reasoning in Daubert should be persuasive because Rule 702 of the Minnesota Rules of Evidence is identical to its federal counterpart, and as such it does not contain any reference to the general acceptance standard. Compare Fed. R. Evid. 702, with Minn. R. Evid. 702. However, the Minnesota Rules of Evidence were promulgated in 1977. See Order Promulgating the Rules of Evidence (Minn. April 1, 1977), reprinted in 50 Minn. Stat. Ann. VII-VIII (West 1980). In 1980 we decided Mack, transforming the standard for admissibility in Minnesota into the two prong Frye-Mack standard. See Mack, 292 N.W.2d at 768-69, 772. In 1989 we decided Schwartz, where we reaffirmed our adherence to Frye-Mack in light of a direct challenge to that standard based on the rules. See Schwartz, 447 N.W.2d at 424-25. There have been no developments in Minnesota since Mack and Schwartz to convince us that the Frye-Mack standard is now incompatible with those same rules of evidence in existence at the time of these decisions. Cf. Leahy, 882 P.2d at 328 (reasoning that by applying the Frye standard after the adoption of the evidence code, the California Supreme Court had concluded Frye was compatible with the code); State v. Copeland, 922 P.2d 1304, 1314 (Wash. 1996) (noting that by adopting the rules of evidence and continuing to adhere to Frye, the Washington Supreme Court "signaled that Frye and the evidence rules coexist as the law of th[e] state [of Washington]").

Finally, the potential for non-uniformity in the law under Daubert gives us considerable cause for concern. Cases built on similar facts and offering similar scientific techniques could have widely disparate results. For example, the Fifth and Ninth Circuit Courts of Appeals have held that Daubert overruled the per se rule excluding polygraph evidence. See United States v. Cordoba, 104 F.3d 225, 228 (9th Cir. 1997); United States v. Posado, 57 F.3d 428, 431-34 (5th Cir. 1995). As a result, each federal district court will need to consider the admissibility of polygraph evidence anew each time it is raised. While some argue that this would ensure that the courts have the flexibility to change as science evolves, this practice will also lead to greater variation in decisions at the district court level that may not be correctable at the appellate level under an abuse of discretion standard of review. See Joiner, 522 U.S. at 142-43 (holding that Rule 702 admissibility determinations are reviewable under an abuse of discretion standard). In contrast, under the Frye prong of the Frye-Mack standard, the trial judge defers to the scientific community's assessment of a given technique, and the appellate court reviews de novo the legal determination of whether the scientific methodology has obtained general acceptance in the scientific community. See State v. Fenney, 448 N.W.2d 54, 58 (Minn. 1989). Thus, Frye-Mack is more apt to ensure "objective and uniform rulings" as to particular scientific methods or techniques-our primary concern in previously refusing to abandon Frye-Mack in Schwartz. See Schwartz, 447 N.W.2d at 424.

Having reviewed the cases and the commentary surrounding this issue, we reaffirm our adherence to the Frye-Mack standard and reject Daubert. Therefore, when novel scientific evidence is offered, the district court must determine whether it is generally accepted in the relevant scientific community. See Moore, 458 N.W.2d at 97-98; Schwartz, 447 N.W.2d at 424-26. In addition, the particular scientific evidence in each case must be shown to have foundational reliability. See Moore, 458 N.W.2d at 98; Schwartz, 447 N.W.2d at 426-28. Foundational reliability "requires the `proponent of a * * * test [to] establish that the test itself is reliable and that its administration in the particular instance conformed to the procedure necessary to ensure reliability.'" Moore, 458 N.W.2d at 98 (alteration in original) (quoting State v. Dille, 258 N.W.2d 565, 567 (Minn. 1977)). Finally, as with all testimony by experts, the evidence must satisfy the requirements of Minn. R. Evid. 402 and 702-be relevant, be given by a witness qualified as an expert, and be helpful to the trier of fact. See State v. Nystrom, 596 N.W.2d 256, 259 (Minn. 1999).

II.

Having concluded that Frye-Mack remains the standard for admissibility in Minnesota, we now consider the district court's decision to exclude appellants' expert witnesses. The district court determined that appellants' experts' methodologies are not generally accepted and not reliable, and thus do not satisfy either prong of the Frye-Mack standard. The standard of review of admissibility determinations under Frye-Mack is two-pronged. Whether a particular principle or technique satisfies the first prong, general acceptance in the relevant scientific field, is a question of law that we review de novo. See Fenney, 448 N.W.2d at 58. District court determinations under the second prong, foundational reliability, are reviewed under an abuse of discretion standard, as are determinations of expert witness qualifications and helpfulness. See Moore, 458 N.W.2d at 96, 98.

Appellants first challenge the district court's determination that their experts failed to use generally accepted methodology in arriving at their conclusions that appellants' exposure to Dursban caused their claimed illnesses.

Appellants argue that the district court's ruling, in essence, makes dose and dose-response data a prerequisite to admissibility of causation evidence. Appellants claim that this is an impossible burden of proof in toxic tort actions as most persons who find themselves exposed to a toxic chemical have no way of immediately measuring the level of exposure they are receiving.(FN9) Appellants' position is that other considerations, such as (1) the temporal relationship between a documented chemical exposure and the onset of symptoms; (2) a differential diagnosis, which eliminates the possibility of competing causes or confounding factors; and/or (3) studies documenting the symptoms associated with exposure, may be conclusive proof of causation even without information quantifying exposure levels.

In response, Dow argues the importance of determining the chemical exposure levels. One of the central tenets of toxicology is that "the dose makes the poison." Federal Judicial Ctr., Moore's Federal Practice, Reference Manual on Scientific Evidence 185 (1995). In other words, "[e]ven water, if consumed in large quantities, can be toxic." Id. Accordingly, it is Dow's position that dose must be a prerequisite to admissibility. A number of courts have required plaintiffs to prove the level of exposure (dose) in order to establish causation. See, e.g., Mitchell v. Gencorp Inc., 165 F.3d 778, 781 (10th Cir. 1999); Allen v. Pennsylvania Eng'g Corp., 102 F.3d 194, 199 (5th Cir. 1996); Wright v. Willamette Indus., 91 F.3d 1105, 1106 (8th Cir. 1996).

While we recognize the discord regarding the necessity of chemical exposure levels for establishing causation, we need not decide what the generally accepted methodology should be because the second prong of the Frye-Mack standard is dispositive here. The district court found that neither Dr. Sherman's nor Dr. Kilburn's methodologies for arriving at their opinions on causation were reliable. We review a district court's findings that expert testimony lacks reliability under an abuse of discretion standard, see Moore, 458 N.W.2d at 98, and will not reverse unless there is clear error, see State v. Nystrom, 596 N.W.2d 256, 259 (Minn. 1999).

In its findings of fact and memorandum of law, the district court identified a number of reasons why Dr. Sherman's methodology was not reliable. First, although Dr. Sherman claimed she conducted a differential diagnosis, she did not review all of appellants' pre-exposure medical records and primarily relied on the oral history appellants gave her. She also failed to explain post-exposure medical tests that reflected normal neurological examinations and blood tests. In addition, the district court determined that the documents and literature relied upon by Dr. Sherman, including a report authored by Dr. Sherman and memoranda authored by EPA employees, were unreliable.(FN10)

The proponent of scientific evidence has the burden to establish the proper foundation for the admissibility of the test by showing that the methodology used is reliable and in the particular instance produced reliable results. See Moore, 458 N.W.2d at 98. In response to these concerns about Dr. Sherman's testimony, appellants simply argued her credentials and referred the court to her affidavit. Appellants do not point to any independent validation of her methodology or otherwise bolster its reliability by addressing the particular concerns raised by Dow. As the record supports the district court's determination, we hold that it was not an abuse of discretion to exclude Dr. Sherman's testimony for lack of reliabilty.

The district court also determined that Dr. Kilburn's methodology was unreliable. Kilburn stated in his affidavit and deposition that there could be no other cause of appellants' illnesses based on his performance of a differential diagnosis. However, in contrast to his affidavit, he admitted at his deposition that he did not review appellants' pre- or post-exposure medical records. Instead Dr. Kilburn relied solely on questionnaires completed by the appellants to rule out any other causes as to their current claimed illnesses. The self-reporting of a plaintiff's medical history in preparation for litigation, without additional independent confirmation, is inherently unreliable. See In re Paoli R.R. Yard PCB Litig., 35 F.3d 717, 762 (3rd Cir. 1994) (excluding expert opinions as to whether illnesses were caused by PCB exposure that were based "solely on the plaintiff's self-report of illness in preparation for litigation," when not confirmed by medical records or examinations, as unreliable).

In addition, and again in contrast to other statements he made, Dr. Kilburn stated at his deposition that he based his conclusion as to causation exclusively on the neuropsychological and neurophysiological tests he conducted on appellants six years after their exposure to Dursban. Dr. Kilburn developed this particular limited battery of tests to assess chemical exposures. He is unaware of any other researcher who also uses these tests, and his battery of tests has not been peer-reviewed. Given these concerns with Dr. Kilburn's methodology, the district court concluded that Dr. Kilburn made too great a leap to get from "mere exposure of an unquantified amount of Dursban" to his conclusions about appellants' illnesses. As this determination is clearly supported by the record, and appellants

merely argued Dr. Kilburn's qualifications and assertions in his affidavit in response, we conclude that the district court did not abuse its discretion in determining Dr. Kilburn's methodologies were unreliable.

III.

Because we affirm the district court's exclusion of appellants' experts, we next consider whether the district court properly granted summary judgment to Dow on the issue of medical causation. Summary judgment is appropriate when the pleadings, depositions, answers to interrogatories, and admissions on file, together with affidavits, show that there is no genuine issue of material fact and that either party is entitled to judgment as a matter of law. See Fabio v. Bellomo, 504 N.W.2d 758, 761 (Minn. 1993). This court reviews the evidence in the light most favorable to the party against whom judgment was granted. See id.

Appellants sought review of the district court grant of summary judgment to Dow on the issue of medical causation. Appellants made no arguments to this court, however, as to how their claims can survive summary judgment on the medical causation issue without their experts. It appears that the only evidence remaining in the record after the exclusion of their experts and other evidence is: (1) the St. Louis County Health Department memorandum, (2) appellants' deposition testimony regarding the onset of their illnesses shortly after moving into the house, (3) the deposition testimony of others who encountered symptoms upon entering the house, and (4) the air samples collected in the house in May and September 1990. None of this evidence individually establishes that appellants' exposure actually caused their illnesses, an essential element of a tort action. See Beckel v. Alexander, 271 Minn. 14, 20, 134 N.W.2d 304, 308 (1965). Without expert testimony linking this remaining information with the appellants' claimed damages, appellants "fail[ed] to make a showing sufficient to establish the existence of an element essential to that party's case." Celotex Corp. v. Catrett, 477 U.S. 317, 322 (1986). Therefore, summary judgment for Dow is affirmed.

IV.

The final issue on appeal is whether the district court properly determined that a number of appellants' claims were either not pleaded or are preempted by federal law pursuant to the Supremacy Clause of the United States Constitution. See U.S. Const. art. VI, cl. 2.(FN11) FIFRA requires pesticides to be registered with the EPA. See 7 U.S.C. 136a(a) (1994). Through this registration process the EPA also regulates the labeling and packaging of pesticides. FIFRA expresses a legislative intent regarding state activity in this field: "State[s] shall not impose or continue in effect any requirements for labeling or packaging in addition to or different from those required under this [Act]." 7 U.S.C. 136v(b) (1994). The Supreme Court has held that common law tort actions are "requirements" that may be preempted by federal laws. See Cipollone v. Liggett Group, Inc., 505 U.S. 504, 521-22 (1992). Thus, FIFRA preempts certain tort actions against insecticide manufacturers.

On a motion for summary judgment, the district court ruled that FIFRA preempted the Goebs' claims regarding "inadequate warnings and instructions on [Dow's] label" and "allegations concerning the adequacy of warnings and instructions for the use of [Dursban] on its label and * * * through point of sale signs, consumer notices or other informational materials." A reviewing court is not bound by and need not give deference to a district court's decision on a purely legal issue. See Frost-Benco Elec. Ass'n v. Minnesota Pub. Utils. Comm'n, 358 N.W.2d 639, 642 (Minn. 1984).

The federal courts that have addressed the issue uniformly hold that FIFRA preempts claims relating to labeling and packaging of federally-registered pesticides. See, e.g., Bice v. Leslie's Poolmart, Inc., 39. F.3d 887, 888 (8th Cir. 1994); Worm v. American Cyanamid Co., 5 F.3d 744, 748 (4th Cir. 1993); Worm v. American Cyanamid Co., 970 F.2d 1301, 1307 (4th Cir. 1992) (Worm I). We therefore hold that FIFRA preempts appellants' failure to warn and inadequate labeling claims, and affirm the district court's grant of partial summary judgment to that effect.

This holding does not complete our analysis, however, as appellants argue that they made other claims which are not preempted by FIFRA, such as:

(1) negligent failure to warn and train applicators;

(2) negligent failure to ensure that label warnings are communicated to people whom the defendants could foresee would be exposed to their product (i.e., homeowners);

(3) negligent failure to properly respond to appellants' questions and complaints about their symptoms (negligent misrepresentation);

(4) negligent advertising and preparation of literature different from their labels;

(5) failure to warn that Dursban may have been contaminated during its production;

(6) negligent failure to test Dursban prior to placing it on the market;

(7) breach of express warranties;

(8) negligent failure to issue warnings after receiving new data about Dursban;

(9) negligent failure to recall Dursban in light of that new data;

(10) negligent compliance with the EPA registration process; and

(11) fraud, deceit, and negligent misrepresentation in the EPA registration process.

In addressing this issue, the court of appeals held that appellants failed to plead all but two of these enumerated claims, and therefore, even if those claims were not preempted by FIFRA appellants could not raise them for the first time on appeal. See Goeb, 1999 WL 561956, at *7. In turn, appellants contend that their pleadings should be construed liberally.

The "primary function of notice pleading is to give the adverse party fair notice of the theory on which the claim for relief is based." Barton v. Moore, 558 N.W.2d 746, 749 (Minn. 1997). Therefore, the pleading of broad, general statements that may be conclusory is permitted, and pleadings need not allege facts to support every element of a cause of action. See id. However, even a liberal reading of appellants' second amended complaint does not give Dow notice of most of the claims identified by the appellants on appeal. From this list of possible claims that appellants argue are not preempted by FIFRA, appellants' second amended complaint only supports claims for negligent misrepresentation and negligent testing.

As a result, appellants' argument is really only that the court of appeals and the district court improperly determined that their claims of negligent misrepresentation and negligent testing were preempted by FIFRA. However, this was not the conclusion of either court. The district court expressly recognized that negligent misrepresentation was not preempted by FIFRA, stating "I wish to make it clear that Plaintiffs Goebs may amend their complaint and assert claims based on their allegation that Defendant Dow was negligent or remiss in its advice on the hotline."(FN12) In addition, the district court's ruling barring claims of inadequate warnings or instructions as preempted by FIFRA does not indicate that negligent testing is also preempted.(FN13) In affirming the district court's FIFRA rulings, the court of appeals recognized that "the district court did not determine that those claims [of negligent misrepresentation and negligent testing] were preempted by FIFRA." Goeb, 1999 WL 561956, at *7. We also affirm and hold that appellants' claims of negligent misrepresentation and negligent testing are not preempted by FIFRA. See 7 U.S.C. 136v(b) (preempting only requirements as to labeling and packaging); Worm I, 970 F.2d at 1307 (holding that state-imposed standards of care relating to product design, manufacture, and testing do not qualify as labeling requirements and thus are not preempted by FIFRA).

Affirmed.

Notes:

(FN1). The other insecticides were Tempo, boric acid, and Pyrethrum.

(FN2)> Both Dow's and appellants' experts explain that overexposure to organophosphate chemicals such as chlorpyrifos can inhibit an enzyme in the body, acetylcholinesterase. Thus, if cholinesterase levels in a person's blood are below normal ("depressed"), it could indicate that the person had an acute overexposure to an organophosphate compound.

(FN3). According to the hospital laboratory reports, Lawrence had a pseudo cholinesterase level on April 26 of 9.8 u/ml, which is within the normal range of 7 to 19 u/ml. Diane's serum cholinesterase level was 2.3 u/ml, within the normal range of 1.7 to 5.0 u/ml and her red cell cholinesterase level was 8.9 iu/ml, within the normal range of 7.7 to 17.3 iu/ml.

(FN4). Appellants claim in their brief that samples were also collected on June 26, 1990, and that those samples showed chlorpyrifos air concentrations of 26 micrograms chlorpyrifos per cubic meter of air in the kitchen. Our review of the record finds no documentation to support this claim. In addition to the October report summarizing the August and September samples, the record does include a letter from a laboratory, dated July 19, 1990, listing the results of unspecified samples received by the reporting laboratory on June 27, 1990. One of these sample results is 24.2 micrograms chlorpyrifos per cubic meter of air. However, no other information was included with the letter, such as the source of the samples or an explanation as to how to interpret the data results.

(FN5). Dow also disputed the conclusion of appellants' experts that appellants are permanently impaired.

(FN6). The NOEL is determined through a toxicological dose-response study. See Federal Judicial Ctr., Moore's Federal Practice, Reference Manual on Scientific Evidence 188 (1995). "The NOEL sometimes is called a threshold, since it is the level above which observable effects in test animals are believed to occur and below which no toxicity is observed." Id. at 188-89.

(FN7). Rule 702, which governs the admission of expert evidence and testimony, states:

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.

Fed. R. Evid. 702.

(FN8). Nonetheless, Joiner suggests that "judges may scrutinize a scientists' conclusions, even when doing so requires judges to make `subtle and sophisticated' scientific evaluations and to wade into areas of scientific controversy and uncertainty." Finley, supra, at 344. Thus, under Joiner, the judge is pushed further into the scientists' domain.

(FN9). Appellants also argue that Dow should be estopped from claiming this perceived deficiency because Dow's misrepresentations led appellants to believe that Dursban was not a concern, inducing them to stay in the house and delaying air sampling. Because the other issues raised are dispositive of this matter, we do not address this argument.

(FN10). The district court found that the case report written by Dr. Sherman was unreliable because it was anecdotal, not scientific, and prepared for litigation purposes. The EPA memoranda, which summarize information garnered from a 1-800 phone "help" line, were excluded by the district court because, among other reasons, the authors of the memoranda caution readers that the data are inherently unreliable.

(FN11). The Supremacy Clause states: "[T]he Laws of the United States * * * shall be the supreme Law of the Land; and the Judges in every State shall be bound thereby, any Thing in the Constitution or Laws of any state to the Contrary notwithstanding." U.S. Const. art. VI, cl. 2.

(FN12). Subsequently, appellants' negligent misrepresentation claim was disposed of by the district court on summary judgment in 1998 on separate and independent grounds. The court of appeals affirmed. See Goeb, 1999

WL 561956, at *9. Because appellants did not petition this court for review of their negligent misrepresentation claim, and the claim was not argued or briefed on appeal, we decline to consider its merits.

(FN13). We note, however, that the claim regarding negligent testing was stricken from the pleadings at the January 1998 motion hearing before the district court after appellants conceded that they were not claiming negligent testing.