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Considerations of Potential Tort Liability With Respect to Natural Draft Cooling Towers Associated With Steam-Electric Power Plants

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CONSIDERATIONS OF POTENTIAL TORT LIABILITY WITH RESPECT TO NATURAL DRAFT COOLING TOWERS ASSOCIATED WITH STEAM-ELECTRIC POWER PLANTS

I. INTRODUCTION

TO COMPLY WITH newly formulated thermal pollution regulations, many power plants are beginning to use cooling towers to control the temperature of the cooling water necessarily involved in most contemporary methods of electric power generation. For technical and economic reasons, a large number of these utility companies are turning to natural draft cooling towers, a European system only recently introduced in the United States. There were only seven U.S. plants using natural draft cooling towers at the beginning of 1971, but by 1972 there were over 25.[1] By 1990, there may be as many as 300 more.[2] However, a paradox exists in that the control of one pollutant often gives rise to another pollution problem and, in the case of cooling towers, the control of thermal pollution may create a concomitant air pollution hazard or result in tort liability.

Since cooling towers are, in effect, required by environmental legislation, and since the natural draft towers represent a rapidly increasing new concept in U.S. environmental control, this paper is limited to an examination of the natural draft tower only, excluding other types. Statutory considerations are also excluded because the Environmental Protection Agency has yet to formulate emission standards for these towers. Research has not revealed any reported cases dealing specifically with natural draft cooling towers. However, because of the potential for pollution and related liabilities, it seems reasonable to believe there may be litigation concerning such towers in the future and it may be possible to predict the results.

II. SUMMARY AND CONCLUSIONS

To prevent thermal pollution and to conserve our water supply, it appears that we must learn to live with natural draft cooling towers, at least for the next several decades. Proponents of natural draft cooling

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1 ELECTRICAL WORLD, Nov. 15, 1971, at 38.

2 Adkins & Jimeson, Factors on Waste Heat Disposal Associated with Power Generation, Feb. 28, 1971 at 40 (Paper No. 26a, presented at the 68th Natl. Meeting, Am. Inst. of Chem. Engrs.).

towers maintain that the possibility of localized fogging and icing is negligible, but the potential hazards of artificial salt fallout are very real. Also, there appears to be a trend developing in the law which could lead to an action against the operator of a natural draft cooling tower for aesthetic annoyances. There are several theories of action which might lie in such cases, but the most logical cause of action is one in nuisance. Recovery, however, would probably be limited to damages, rather than injunctive relief.

Present levels of engineering technology indicate that it should be feasible to build a nonhazardous natural draft cooling tower. Therefore, it is incumbent upon power plant owners to build their cooling towers to essentially a "zero discharge" standard, or to build them at a reasonable distance from the public.

III. BACKGROUND

The consumption of electric power in the United States is expected to double every 10 years through 1990.[3] Naturally, power generating capacity must increase proportionately. At the present, over 80% of the electric power produced in this country is generated in steam-electric plants.[4] Since new sites for hydroelectric power plants—in which the turbines are turned by rapidly moving water—are becoming rather scarce, and since it is generally believed that non-steam power (solar power, direct conversion, etc.) will not be economically or technically feasible until the early part of the next century, it seems reasonable to believe that the number of steam-electric plants, both nuclear and fossil-fueled (coal, oil, or gas), will increase dramatically during the next twenty-five years. However, an unfortunate characteristic of steam-electric plants is their rejection of large amounts of heat energy. When fossil or atomic fuel is utilized to make electricity, approximately one-third of the fuel energy is converted into electric energy and the other two-thirds of the fuel energy is lost as waste heat.[5] This waste is called "thermal pollution."[6]

It is this waste heat which, when discharged into bodies of water near the power plant, changes the temperature of the water and leads to a decline of aquatic life. Therefore, since this waste heat must be removed from power plants, and since cooling by water is the most feasible method, steps must be taken to assure that the water is not returned to its

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[3] *Id.* at 5.

[4] *Id.*

[5] Lusby & Somers, Electric Power Plant Effluent—Thermal Pollution or Energy at Bargain Price? Nov. 28, 1971 at 2 (Paper No. 71-WA/Ener-7, presented at the Annual Winter Meeting, Am. Socy. of Mech. Engrs.).

[6] KRIER, ENVIRONMENTAL LAW AND POLICY 347 (1971).

source at a biologically dangerous temperature. (A number of states have set 68° F as the maximum allowable water temperature, with from 0° to 5° F as the maximum allowable temperature change for streams with cold water fisheries. States in warmer areas have set maximum allowable temperatures in the 83° to 93° F range, with allowable changes of 4° or 5° F.)[7]

To comply with thermal pollution standards, power companies use a variety of methods to control their waste heat. Some steam-electric plants, especially those with a smaller degree of heat rejection, are able to use a "once-through" cooling system if they are located on a major body of water, such as the ocean. This method is relatively simple: cooling water is drawn into the power plant, used to absorb waste heat, and returned, untreated, to its source. Larger power plants on smaller bodies of water cannot use this method. Other steam-electric plants employ cooling ponds, either natural or man-made, for cooling purposes. This process is similar to the "once-through" procedure except the same water (the pond water) is used continuously. Surface evaporation, sometimes augmented by spraying devices, is relied upon to keep the pond water reasonably cool. The obvious drawback is that an extremely large amount of pond surface must be available; as a general rule, a pond surface of one or two acres is normally required to dissipate the heat from each megawatt of electric power generated,[8] and plants of 1000-2500 megawatt capacity are not uncommon. Again, larger power plants on smaller bodies of water cannot use this method. For the remaining steam-electric plants, those unable to use "once-through" cooling or cooling ponds, an alternative cooling method is needed to avoid the creation of thermal pollution. The only feasible answer, at least for the present and near future, seems to be the use of cooling towers, a relatively new concept in the United States.

These cooling towers may be of several types: wet or dry, artificial draft or natural draft.[9] Wet towers provide for cooling by direct contact between the heated water and the air, while dry towers provide for cooling by circulating the heated water through pipes which are exposed to air—much like the radiator of an automobile. Artificial draft towers use large fans to force air through the cooling system while natural draft towers use the construction of the tower itself to force air through the cooling system—much like a chimney. Since, for many contemporary applications, the natural draft wet tower is the most feasible and economical, this type of tower will probably see widespread use over the next twenty-five years. As few as one-hundred forty and as many as

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[7] Adkins & Jimeson, supra note 2, at 29.

[8] *Id.* at 19.

[9] *E.g., supra* note 2.

three hundred new plants will require cooling towers before 1990.[10] It is reasonable to assume that a great percentage of these towers will be of the natural draft wet variety.

IV. DESCRIPTION OF NATURAL DRAFT WET COOLING TOWERS

The natural draft wet cooling tower is simply a large, circular, concrete shell which may be two hundred feet in diameter and five hundred feet high.[11] The chimney-like structure causes an upward draft by drawing outside air through openings in the base and across rows of packing material over which the hot water from the power plant is pumped. As the air passes over the water, heat is exchanged and the water is cooled, leaving the now-heated air to exit the top of the tower. The air leaving the tower, however, is very moist and sometimes creates a "plume" of water vapor as the hot, moist air leaving the tower strikes the cooler air of the atmosphere and condenses into a cloud-like mist. It is this plume, and the very minute droplets of water entrained in the air ("drift") plus the impurities associated with the drift that may give rise to environmental problems and, if they cause damage to persons or property, to potential liability in tort. Figure 1, on the following page, shows a typical natural draft wet cooling tower and exaggerated plume effects.

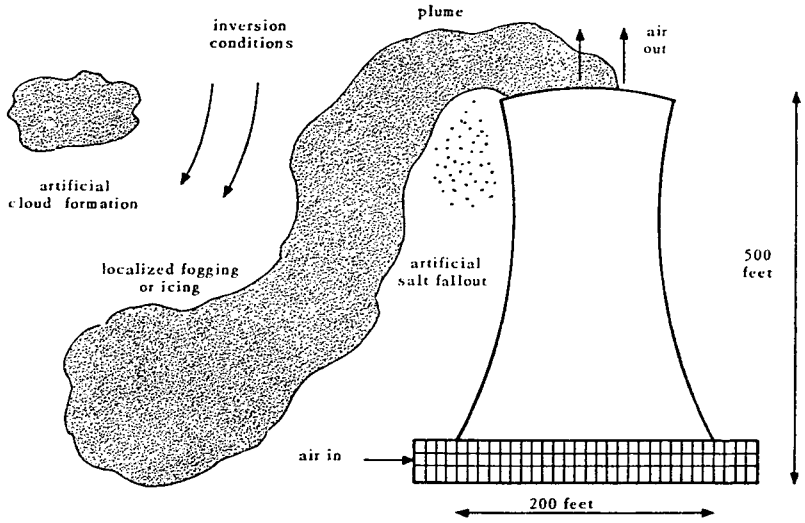

Figure 1. NATURAL DRAFT WET COOLING TOWER

[10] *Id.* at 40.

[11] BUS. WEEK, April 3, 1971, at 54.

V. POTENTIAL LIABILITY CONSIDERATIONS

Considerations of potential liabilities which may be incurred by the maintenance and operation of natural draft cooling towers fall into three categories:

1. localized fogging and icing
2. particulate and chemical fallout
3. aesthetic disturbances

Localized Fogging and Icing

To give some idea of the magnitude of the water vapor which may escape from a natural draft tower, the loss by evaporation out the top of such a tower at a 2500-megawatt plant can amount to 30 million gallons per day.[12] Even so, proponents of natural draft towers argue that the possibility of fogging and icing caused by the cooling tower plume is almost negligible because these towers discharge the water vapor at great heights.[13] This argument seems, thus far, to be supported by a complete absence of cases dealing with natural draft cooling towers. However, if such localized fogging or icing should occur because of the operation of a natural draft tower, it should be fairly easy to predicate liability by reasoning from cases involving other types of power plant cooling methods. *Skelly Oil Co. v. Johnston*[14] dealt with an automobile accident caused by mist from industrial cooling towers settling on an oil-surfaced road. The cooling towers in that case were apparently the smaller (30-35 feet) artificial draft types but the theory of liability (negligence), based upon a landowner's duty to prevent unreasonable risks to travelers on a nearby public way, seems equally applicable to natural draft towers.

The court in *Skelly* recognized the general rule that drivers of motor vehicles are held to a standard of care commensurate with the circumstances,[15] but the plaintiff's actions, *even though he knew* that the towers sometimes caused slippery spots in the roadway, were held to be reasonable.

Skelly was distinguished in *North Little Rock Transportation Co. v. Finkbeiner*[16] on the basis of a knowledge requirement. In *North Little Rock Transportation Co.*, the landowner was found not negligent when a car skidded on a wet spot in the road caused by an overflow from a lawn sprinkler system, because the sprinkler had been checked on several

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12 INDUSTRIAL WATER ENGINEERING, May, 1970, at 54, *citing* address by G. Ford at symposium on thermal pollution sponsored by the FWPCA and Vanderbilt University (1968).

13 INDUSTRIAL WATER ENGINEERING, May, 1970, at 54, *citing* address by E. Aynsley at Cooling Tower Inst. meeting (Jan. 26, 1970).

14 151 S.W.2d 863 (Tex. Civ. App. 1941).

15 *See, e.g.*, Ashworth v. Detroit, 293 Mich. 397, 292 N.W. 345 (1940); McCormick v. Sioux City, 243 Iowa 35, 50 N.W.2d 564 (1951).

16 North Little Rock Transp. Co. v. Finkbeiner, 243 Ark. 596, ..., 420 S.W.2d 874, 878 (1967).

occasions and had never previously caused trouble. In *Skelly*, the condition had existed for a number of years.

However, the courts seem to agree that actual knowledge is not necessary and that liability may be found when the landowner *should have known* of the dangerous condition.[17] Since some scientists believe that it is reasonably possible to predict natural draft cooling tower plume dimension and incidence by using published weather data,[18] it would seem that the operator of such a tower could not escape liability by alleging a lack of knowledge under the rule of *North Little Rock Transportation Co.* In fact, in *Lavelle v. Grace*,[19] the operator of an industrial plant was found liable for an automobile accident which occurred when steam from the plant drifted across a nearby roadway because the possibility of such a hazardous condition was "so obvious."[20] In that case, the wind which carried the steam across the road, obscuring the vision of the plaintiff, was held to be not an intervening cause, but a concurrent or contributing cause because the defendant should have expected it.[21]

Another related situation is reported in *Vaughn v. Missouri Power & Light Co.*[22] Here, mist containing deleterious chemicals was blown from a power plant cooling pond onto the property of nearby landowners. Dwellings were damaged and, during winter weather, ice was formed on porches, sidewalks, etc. The court rejected an eminent domain defense and found liability on a nuisance theory, even though the word "nuisance" was not contained in the petition. Actual and punitive damages were awarded.[23]

Weather alteration by artificial cloud formation is another aspect of cooling tower operation which may give rise to liability. As yet, there is very little data regarding this phenomenon. However, one source reports:

> There are frequent occasions when tower plumes can be seen to evaporate and then recondense to some extent at higher altitudes further downwind. Under stable conditions with higher humidities the plumes will persist after leveling off and appear downwind as stratus cloud coverage, or merge and reinforce existing cloud coverage.
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> Initiation of cumulus clouds is a rare occurrence and on such occasions clouds triggered by the towers only precede natural cloud formations.[24]

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[17] *See, e.g.*, Pitcairn v. Whiteside, 109 Ind. App. 693, 34 N.E.2d 943 (1941).

[18] COMBUSTION, Oct., 1954, at 30.

[19] Lavelle v. Grace, 348 Pa. 175, 34 A.2d 498 (1943).

[20] *Id.* at 181, 34 A.2d at 501.

[21] *Id.*

[22] Vaughn v. Missouri Power & Light Co., 89 S.W.2d 699 (Mo. App. 1935).

[23] *Id.* at 702.

[24] Aynsley, *supra* note 13.

It seems possible that there will be liability when a plaintiff can show that he was damaged by artificial cloud formation or resultant increased precipitation. By analogy, precedent may be found in the weather modification cases. However, only a few such cases have been decided and the defendants have generally been able to avoid liability because of the difficulty in proving causation.[25]

Particulate and Chemical Fallout

The plume which escapes from the top of a natural draft cooling tower is composed of water vapor (evaporated water and "drift," minute droplets of water actually entrained in the air flow) created when the cooling air comes into contact with the heated water from the power plant. It generally looks white, pure, and steamy but, depending upon the type of coolant water used, or its chemical treatment, it may contain many types of impurities. If, for example, a power plant were to use a salt-water coolant, then a certain percentage of this water would be lost through the top of the tower as drift. The drift discharged to the atmosphere would be salty and, eventually, would precipitate to the earth—possibly to the detriment of neighboring farmlands and residential areas—as "artificial salt fallout." If this situation seems untenable, one must consider the plight of landowners in close proximity to such power plants as the Southwestern Public Service Company's Nichols Station. It is reported that sewage effluent is used for cooling tower water at this particular plant.[26] The potential hazards to the ecology or the nearby population from a cloud containing detergents and organic matter are obvious. A similar situation can arise when chemicals, such as chlorine, are used to kill algae or fungi which may form on the heat-exchanging surfaces of the cooling tower. Or, if the power plant associated with the cooling tower burns fossil fuels, the exhaust from the smokestack may contain sulfur dioxides which, if mixed with the water vapor escaping from the tower, can form a mist containing sulfuric acid,[27] capable of damaging property or health.

To better appreciate the problem, consider a hypothetical power plant with a 2500-megawatt capacity. Assume a "makeup" (water used to replace natural losses) of 2% at 200 ppm (ppm=parts per million) of impurities and drift loss of 0.2%. All of these are reasonable numbers, yet the amount of solids discharged to the air will be four tons per day[28]—

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[25] *Report of the Task Group on the Legal Implications of Weather Modification*, in CONTROLLING THE WEATHER, 10 (H. Taubenfeld ed. 1970).

[26] INDUSTRIAL WATER ENGINEERING, May, 1970, at 53, *citing* paper presented by C. Waselkow at symposium on thermal pollution sponsored by the FWPCA and Vanderbilt University (1968).

[27] ELECTRICAL WORLD, May 11, 1970, at 43.

[28] Ford, *supra* note 12.

or, if the plant operates 300 days out of the year, 1,200 tons of pollutants every twelve months. Or, consider the plant using seawater coolant. Seawater contains about 30,000 ppm impurities in the form of dissolved salts. An example found in the technical literature suggests that a 1000-megawatt plant using seawater in a tower with a 0.1% drift would discharge about 125 tons of salt to the air each day, or approximately 37,500 tons per year.[29] The author has been advised that the general industry standard for drift loss is approaching 0.005%. This would mean that the hypothetical 1000-megawatt plant using seawater coolant would discharge only six tons of salt from the tower each day. However, this is still 1,800 tons per year, and the discharge would, of course, be increased as the plant capacity was increased.

A side effect to this problem occurs during the summer months when the plant must operate with a higher cooling-water temperature and a higher ambient air temperature. For plants relying on cooling towers, this means a lowered plant efficiency, which means that more fuel must be burned, which ultimately means that the smokestack discharge will contain more ash and gases—in addition to the tons of pollutants escaping daily from the cooling tower.

Liability for the deposit of airborne solids and chemicals carried by cooling tower drift can be found by analogizing from the myriad of smoke and chemical fog cases.[30] A leading case in this area is *Martin v. Reynolds Metals Co.*[31] This was an action in trespass brought to recover for injuries caused when fluoride compounds, in the form of gases and airborne particulates, settled on the plaintiff's land. The court held that trespass will lie for any intrusion that violates a property-owner's protected rights, even though the intruding matter is invisible (as would be the case with impurities contained in the minute droplets of water discharged from a natural draft tower).[32]

Aesthetic Disturbances

By the nature of their size, a cluster of natural draft cooling towers, or even a single one, may be considered unsightly[33] or aesthetically disturbing. It has generally been held, though, that aesthetic considerations, in and of themselves, will not support a finding of nuisance[34]—albeit unsightliness may properly be considered along with other factors.

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[29] TECHNOLOGY REVIEW, Dec., 1971, at 48.

[30] *See, e.g.*, Renken v. Harvey Aluminum, 226 F. Supp. 169 (D. Or. 1963); Gibson v. Mulholland, 399 S.W.2d 293 (Ky. 1966); Collins Construction Co. v. Tindall, 386 S.W.2d 218 (Tex. Civ. App. 1965).

[31] Martin v. Reynolds Metals Co., 221 Or. 86, 342 P.2d 790 (1959).

[32] 342 P.2d at 797.

[33] *Supra* note 29.

[34] *See, e.g.*, Vermont Salvage Corp. v. St. Johnsburg, 113 Vt. 341, 34 A.2d 188 (1943).

However, in spite of the majority holding, a minority view holds aesthetic nuisances, which could conceivably include natural draft cooling towers, may be enjoined. In *State ex rel Carter v. Harper*,[35] the Wisconsin Supreme Court said:

> Nauseous smells have always come under the ban of the law, but ugly sights and discordant surroundings may be just as distressing to keener sensibilities. The rights of property should not be sacrificed to the pleasure of an ultra-aesthetic taste. But whether they should be permitted to plague the average or dominant human sensibilities may well be pondered.[36]

Indeed, aesthetic considerations *were* pondered in the 1937 West Virginia case of *Parkersburg Builders Material Co. v. Barrack*.[37] This case held that an automobile wrecking yard could not be enjoined because of its unsightliness. The court then went on to state, by way of dicta, that unsightly things should be so located as to avoid offensiveness to the public and that suit might lie in equity to restrain such offenses.[38] The concurring opinion[39] objected strenuously to these statements and cited numerous cases (including one concerning grain storage tanks 60 feet high)[40] which held that mere unsightliness will not give rise to an order of direct injunctive relief. The concurring judge also said:

> It would seem that nothing could be more highly objectionable, as far as the impression to be made on one's vision is concerned, than the total shutting off of all view. This amounts to unsightliness in a very literal sense. Yet, the uniform holdings in this country are to the effect that obstructions of view, and even of light and air, will not be enjoined on that account alone.[41]

However, notwithstanding precedent and the strong admonitions of the concurring opinion, *Parkersburg Builders Material Co.* (and its dicta) has been cited and followed in a number of cases. The most vigorous of these was *Farley v. Graney*[42] in 1960. The *Farley* court, in upholding a zoning statute pertaining to the operation and maintenance of a junk yard, followed *Parkersburg Builders Material Co.* enthusiastically, stating:

> ...We note also that Parkersburg Builders Material Co. v. Barrack, supra (118 W. Va. 608, 191 S.E. 371), is a precedent for the proposition that *"persons may entertain appreciation of the aesthetic*

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35 State *ex rel* Carter v. Harper, 182 Wis. 148, 196 N.W. 451 (1923).

36 182 Wis. 148, ..., 196 N.W. 451, 455 (1923).

37 Parkersburg Builders Material Co. v. Barrack, 118 W. Va. 608, 191 S.E. 368 (1937).

38 118 W. Va. 608, ..., 191 S.E. 368, 371.

39 118 W. Va. 608, ..., 192 S.E. 291 (Concurring opinion printed separately in S.E. Reporter).

40 Shepler v. Kansas Milling Co., 128 Kan. 554, 278 P. 757 (1929).

41 118 W. Va. at ....., 192 S.E. at 293.

42 Farley v. Graney, 146 W. Va. 22, 119 S.E.2d 833 (1960).

and be heard in equity in vindication of their love of the beautiful" . . . (emphasis by the court).[43]

Thus, over the course of 23 years, the dicta in *Parkersburg* had risen to the status of "precedent for the proposition" in *Farley*. If these circumstances herald a trend in the law and a judicial willingness to enjoin an alleged nuisance on aesthetic grounds alone, then it seems entirely possible that a landscape-dominating, scenery-obstructing cooling tower could one day be the subject of a suit for injunctive relief.

VI. CAUSES OF ACTION

The causes of action available to one injured as a result of the operation of a natural draft cooling tower cover a wide and variegated range. Based on the type of injury and the circumstances of each case, the court will have to consider such factors as standards of care, competing interests, and the subtleties of a relatively new engineering technology with which the court will most likely be totally unfamiliar. These considerations, coupled with the fact that there seem to be no reported cases directly in point, indicate that no concrete, definitive rule can be derived from prior litigation. Until such time as the various environmental agencies and the legislatures promulgate standards to regulate the maintenance and operation of natural draft cooling towers, a plaintiff must seek his cause of action among the general laws of tort liability. These causes of action, broken down into negligence and non-negligence theories, are discussed in the following paragraphs.

Negligence

A landowner or an occupant of land who, through negligence, allows gases or steam (as from a cooling tower) to escape from his property and cause injury to others will be liable in damages.[44] A finding of negligence requires a showing of causation and that the defendant breached a duty to use due care; intent is immaterial.[45]

As applied to potential cooling tower litigation, it is important to note that the standard of care required of a defendant in a negligence action is whatever is reasonable under the circumstances. This may create problems insofar as there are no standards derived for the reasonable operation of a natural draft tower. However, as pointed out in *Lavelle v. Grace*,[46] the consequences of allowing steam to drift onto neighboring land or across a public roadway are deemed foreseeable and a court should have little difficulty in finding liability on that basis. Indeed, when

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[43] *Id.* at ....., 119 S.E.2d at 847.

[44] Defiance Water Co. v. Olinger, 54 Ohio St. 532, 44 N.E. 238 (1896); Smith v. Bd. of County Rd. Comm'rs., 5 Mich. App. 370, 146 N.W.2d 702 (1966).

[45] Green, *The Causal Relation Issue in Negligence Law*, 60 MICH. L. REV. 543 (1962).

[46] 348 Pa. 175, 34 A.2d 498 (1943).

the direct evidence concerning the cause of the injury is primarily in the control of the defendant, a *res ipsa loquitur* theory could be available to show a lack of proper care when the instrumentality causing the damage is under the defendant's exclusive control.[47]

Non-negligence Theories

1. Trespass

Liability in trespass to real property requires a physical invasion of the property-owner's domain and thus an interference with his exclusive possession. The question of intent to trespass is immaterial.[48] As noted in *Martin v. Reynolds Metals Co.*,[49] it is not required that such an invasion be by visible, tangible pieces of matter; if the intruding "thing" is capable of measurement by scientific means, then it seems likely that an action in trespass would lie.[50] This theory of liability, then, appears applicable to injuries derived from the deposit of solid substances escaping from a cooling tower—and, in a lesser sense, to injuries caused by localized fogging (if the plaintiff can successfully argue that minute droplets of water in a vapor form constitute tangible particles).

2. Doctrine of *Rylands v. Fletcher*[51]

The *Rylands* case, discussed extensively in the literature, is probably the forerunner of subsequent holdings of liability without fault for the maintenance of dangerous conditions on land. In *Rylands*, defendants created an artificial reservoir on their land. The water in this reservoir escaped into old coal mining tunnels below the defendant's land and subsequently flooded plaintiff's tunnels (which connected with those under the reservoir). Judgment was for the plaintiff on the theory that whosoever brings a dangerous instrumentality on his land is prima facie answerable for the damages caused by the escape of the dangerous thing; this was held to apply no matter what precautions the defendant had taken.[52]

The first impression is that *Rylands* and its progeny would apply to the operation of a natural draft cooling tower but the doctrine has not found great acceptance in the American courts and was rejected in *Fritz v. E. I. DuPont de Nemours & Co.*,[53] a 1950 case involving the escape, without negligence, of harmful gases from the

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47 *See*, Metz v. Central Illinois Electric and Gas Co., 32 Ill.2d 446, 207 N.E.2d 305 (1965).

48 Hakkila v. Old Colony Broken Stone & Concrete Co., 264 Mass. 447, 162 N.E. 895 (1928).

49 221 Or. 86, 342 P.2d 790 (1959).

50 *Id.* at ....., 342 P.2d at 794.

51 L.R. 1 Ex. 265 (1866), *aff'd* L.R. 3 H.L. 330 (1868).

52 *Id.* at .....

53 Fritz v. E. I. DuPont de Nemours & Co., 45 Del. 427, ..., 75 A.2d 256, 260 (1950).

defendant's premises. (This would seem analogous to the escape of water vapor, etc., from a cooling tower.)

3. Liability for Ultrahazardous Activities

Closely akin to *Rylands* is the doctrine of liability for damages caused as a result of the defendant's ultrahazardous activities, no matter how much care was exerted to prevent such injuries. According to the Restatement of Torts, an ultrahazardous activity is defined as one which:

> (a) necessarily involves a risk of serious harm to the person, land or chattels of others which cannot be eliminated by the exercise of the utmost care, and
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> (b) is not a matter of common usage.[54]

Although this theory is usually applied to cases involving blasting, operating fireworks factories, etc., it would seem feasible that a plaintiff injured by emissions from cooling towers could rely on this doctrine. However, the relevant reported cases are few and do not provide definitive guidelines. For example, *Luthringer v. Moore*,[55] granted relief on the basis that the escape of harmful gases constituted an ultrahazardous activity,[56] while *Fritz v. E. I. DuPont de Nemours & Co.*,[57] held that the use of chlorine gas in a chemical plant is not an ultrahazardous activity.[58]

4. Maxim of *Sic Utere Tuo Ut Alienum Non Laedas*

The maxim of *sic utere*, meaning that one should use his property so as not to injure that of another, is similar to nuisance. This basic concept has been applied in cases involving the escape of harmful gases[59] and would seem applicable to damages caused by localized fogging from cooling towers. However, since some courts have required a noncomitant showing of negligence or have qualified the doctrine in other ways, it is probably more realistic for a plaintiff to bring his action in negligence—especially since some courts have dismissed the *sic utere* doctrine as being mere surplus verbiage.[60]

5. Restatement of Torts

The Restatement of Torts gives the rule for a nontrespassory interference with another's interests in land as:

> The actor is liable in an action for damages for a nontrespassory invasion of another's interest in the private use and enjoyment of land if,

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[54] RESTATEMENT OF TORTS, § 520 (1938).

[55] Luthringer v. Moore, 31 Cal.2d 489, 190 P.2d 1 (1948).

[56] *Id.* at ....., 140 P.2d at 7.

[57] 45 Del. 427, 75 A.2d 256 (1950).

[58] *Id.* at ....., 75 A.2d at 261.

[59] *See, e.g.*, Morgan v. High Penn Oil Co., 238 N.C. 185, 77 S.E.2d 682 (1953).

[60] Rose v. Socony-Vacuum Corp., 54 R.I. 411, 173 A. 627, 629 (1934).

(a) the other has property rights and privileges in respect to the use or enjoyment interfered with; and

(b) the interference is substantial; and

(c) the actor's conduct is a legal cause of the invasion; and

(d) the invasion is either

(i) intentional and unreasonable; or

(ii) unintentional and otherwise actionable under the rules governing liability for negligent, reckless, or ultrahazardous conduct.[61]

This seems to be a combination of many theories and should be viewed as being not the law, but merely a restatement of the law. Nevertheless, the rule has been followed in a few cases.[62]

6. Nuisance

Nuisances may be public nuisances or private nuisances; the former affects the public at large while the latter applies only to individuals. A nuisance may also be classified as nuisance per se (objectionable at all times regardless of circumstances or location) or nuisance in fact or, sometimes, per accidens (not a nuisance per se, but objectionable because of circumstances or location).[63] A nuisance theory may be the most feasible and most logical route to recovery for one damaged as the result of the operation of a natural draft cooling tower.

An obvious defense to an action in nuisance against the operator of a cooling tower would seem to be immunity by virtue of government authorization or eminent domain, since cooling towers are necessarily associated with power plants which, in turn, come under the auspices of legislative sanction as a public utility. However, the weight of authority indicates that such a defense cannot be relied upon, since the damage may be classified as private, rather than public, nuisance[64] and since the plaintiff can raise a constitutional requirement of compensation for damage caused by the operation of public works.[65]

Thus, an action for private nuisance may be the best method to use in recovering damages incurred because of the maintenance and operation of a natural draft cooling tower. Liability can be established by reasoning from the smoke and fume cases or from cases like *Vaughn v. Missouri Power & Light Co.*,[66] which seems more directly in point. Recovery, though, depends largely upon the facts of each case, including consid-

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61 RESTATEMENT OF TORTS, § 822 (1938).

62 *See* Patterson v. Peabody Coal Co., 3 Ill. App.2d 311, 122 N.E.2d 48 (1954).

63 58 Am. Jur. 2d. *Nuisances* § 12 (1971).

64 Alabama Power Co. v. Stringfellow, 228 Ala. 422, 153 So. 629 (1934).

65 Williams v. Meridian Light & Ry. Co., 110 Miss. 174, 69 So. 596 (1915).

66 Vaughn v. Missouri Power & Light Co., 89 S.W.2d at 699 (Mo. App. 1935).

erations of defendant's method of operation, ease of abatement, location, extent of injuries, etc.

VII. REMEDIES

Remedies in a suit against the operator of a natural draft cooling tower may be either injunctive relief or a judgment for damages. An action for damages will, of course, afford only the temporary relief of money, while an injunction will prevent the recurrence of the offensive act or condition. However, an injunction will be much more difficult to obtain in this type of case, for two reasons:

1. Equitable relief will not be granted when there is an adequate remedy at law, i.e., damages.[67]
2. Injunctive relief will be denied when the benefit to the plaintiff will be far outweighed by the inconvenience to the defendant.[68]

This is not to say, though, that an injunction of a certain degree will not be granted (e.g., against operation during inversion conditions) or that a cooling tower cannot be enjoined before it is built.

To recover for damages, which may be temporary or permanent, the plaintiff will have to show the diminution in property value resulting from the injury or some other form of calculable hurt. This may afford present relief to the plaintiff but he cannot recover for prospective damages and may be compelled to seek successive recoveries for subsequent injuries. In this respect, *Boomer v. Atlantic Cement Co., Inc.*,[69] should be distinguished. In *Boomer*, a 1970 case, the court refused to enjoin a cement plant which was polluting the air by giving off dust and smoke, and granted permanent damages instead. The rationale was that the operation of the plant would not be enjoined because technology permitting operation of the plant without pollution had not yet been developed. Proponents of natural draft cooling towers cannot rely on *Boomer* because, as will be pointed out in the next section, sufficient technology does exist (or will exist shortly) to prevent or, at least, to forestall the occurrence of localized fogging and icing.

VIII. PRESENT LEVEL OF TECHNOLOGY IN A LEGAL CONTEXT

It has been argued that: "... as in all other negligence cases, duty should be determined by balancing the foreseeable risk of harm generated by the landowner ... against the expense and inconvenience of avoiding it."[70] This reasoning is applicable to the maintenance and operation of natural draft cooling towers. Engineers are well aware of the potential

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[67] 43 C.J.S. *Injunctions* § 25 (1945).

[68] *Id.*, § 30.

[69] Boomer v. Atlantic Cement Co. Inc., 26 N.Y.2d 209, 309 N.Y.S.2d 312, 257 N.E.2d 870 (1970).

[70] BLOUSTEIN, *Torts*, 1964 ANNUAL SURVEY OF AMERICAN LAW 429, 430.

problems — environmental, tortious, and otherwise — and methods of prevention are becoming more well known. Devices known as "drift eliminators" can be installed in the lower parts of such towers to reduce the amount of entrained water droplets which are discharged to the atmosphere. Although most contemporary towers are probably guaranteed not to exceed 0.1% drift loss, it is interesting to note an item which appeared in one of the trade journals:

> The new tentative standard for cooling tower drift quantity of 0.03 per cent of the cooling water flow is a major improvement in relation to reducing the possible effects of salt fallout on the local ecology. The projected 0.002 per cent drift quantity should effectively minimize ecological problems which may be associated with artificial salt fallout.[71]

The same article points out, with respect to localized fogging, that: ". . . [R]esults obtained from this analysis seem to indicate that there is a possibility of predicting plume dimension and incidence with some success using applicable published weather data."[72] This last consideration is borne out by the recognition of a new specialist, a hydrometeorologist, frequently called upon to evaluate a potential power plant site. It appears that such scientists can determine the likelihood of cooling tower fog formation from local topography and an analysis of prevailing weather conditions.[73] If, indeed, this is the case, then the question of lack of foreseeability is mooted and, absent drastic circumstances, there should be little or no excuse for a local fog hazard created by a natural draft tower.

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[71] COMBUSTION, *supra* note 18.

[72] *Id.*

[73] POWER ENGINEERING, Aug., 1970, at 49.

Editor's Note: After this article went to press it was learned that litigation had been initiated in Switzerland to prevent the construction of a natural draft cooling tower near the village of Kaiseraugst. One of the issues mentioned was "plume overshadowing," POWER ENGINEERING, Dec. 1972, at 31.