

Montana State Legislature

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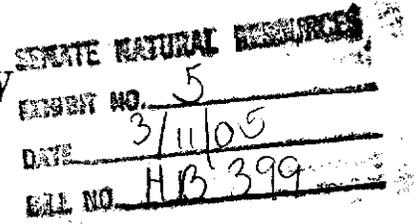
Weather Modification Law in the USA

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Introduction

Weather modification is the effort of man to change naturally occurring weather, for the benefit of someone. The best-known kind of weather modification is *cloud seeding*, with the goal of producing rain or snow, suppressing hail (which can ruin crops), or weakening hurricanes.

People who live in the city do not give any thought to water: they turn on the faucet and water appears. But water is a constant concern for farmers and ranchers: drought can bankrupt a farmer and force a rancher to sell his/her cattle at an undesirable price. The legal right to access water is an important part of property law. There are many legal disputes about one person or one state extracting "too much" water from a river and thereby depriving everyone downstream. Because water is absolutely essential to the financial survival of farmers and ranchers, public hearings about allocations of water (including proposed cloud seeding) are often highly emotional events.

This essay briefly reviews governmental regulation of weather modification, then concentrates on judicial opinions regarding modified weather or cloud seeding and suggests how future weather modification torts might be argued. The scope of this essay does *not* cover liability for inadvertent weather modification, such as:

- release of heat or smoke from industrial smokestacks;
- injection of water vapor and particulates from jet airplane engines into the dry stratosphere;
- release of heat and airborne particulates from cities;
- pollution from automobiles;
- global warming from release of CO₂ by burning wood, coal, oil, or natural gas; or
- removal of ozone by release of fluorocarbons into the atmosphere.

This essay also does *not* consider purely local weather modification, such as dissipating fog in supercooled clouds at an airport.

This essay was initially written to inform:

- potential plaintiffs (e.g., farmers, ranchers, and people who might be victims of a flood),
- meteorology students, and
- attorneys and law students working in either environmental law or water law,

about the nationwide law in the USA that affects tort liability for cloud seeding. (I am *not* opposed to cloud seeding, but experienced cloud seeders and their attorneys already know, or should know, the basic information in this essay.) This essay is intended only to present general information about an interesting topic in law and is *not* legal advice for your specific problem. See my [disclaimer](#).

The history of cloud seeding also makes an interesting case study in the interaction between scientists and society: not only about the obligations and ethics of scientists, but also about how courts have avoided deciding cases involving technical issues about weather modification.

1. Technology

Release of silver iodide (AgI) into an existing supercooled cloud (i.e., air temperature between -39 and -5 celsius) can convert water vapor to ice crystals, which is called sublimation. The ice crystals nucleated by the AgI will grow and local water droplets will shrink. The latent heat released by converting water vapor (or liquid water) to ice will increase vertical air motion inside the cloud and aid the convective growth of the cloud. Raindrops or snowflakes will grow larger by falling through a taller cloud. Also, moist air from evaporated moisture in the soil will be sucked into the base of the cloud by convection (i.e., updraft), thus increasing the total amount of water in the cloud. Perhaps 30 minutes after the AgI release, snow may fall below the cloud. Depending on the temperature and humidity below the cloud, the snow may change to rain, or even evaporate, before reaching the ground.

To sharpen the focus of this essay on the law of cloud seeding, I have moved my discussion of cloud seeding technology to a separate [document](#). That document contains a discussion of:

- history of early (e.g., 1946-51) cloud seeding experiments, with emphasis on legal issues;
- some technical problems with cloud seeding experiments;
- a few excerpts from the official policy of the American Meteorological Society on cloud seeding technologies;
- environmental concerns and terse comments on the ethics of scientific experiments; and
- the need for more basic scientific research.

2. Governmental Licensing and Regulations

Various state governments license and regulate commercial weather modification. These regulations are desirable because:

- weather is part of the natural environment that belongs to everyone.
- governments regulate the allocation of water from rivers to landowners, so it was natural for governments to also regulate attempts to enhance rainfall.
- some cloud seeders in the 1950s and 1960s were charlatans who exploited desperate farmers in a drought, which led to government programs to license cloud seeders, in order to protect the public.

There are two common features of state regulations:

1. ensure that commercial weather modification companies are competent (e.g., states often require cloud seeders to have earned at least a bachelor's degree in meteorology or a related field, plus have experience in weather modification); and
2. require companies have the resources to compensate those harmed by their weather modification (so-called "proof of financial responsibility"). In practice, such proof requires cloud seeders either to purchase liability insurance or to post a bond. Minimum amounts of insurance specified in old statutes are now woefully inadequate, because of inflation since the statute was written.

The governmental regulation of cloud seeders is generally a two-step process. First, the government licenses individual cloud seeders. Second, the government grants a permit to a licensed cloud seeder to conduct operations at a specific place and range of times.

Some states require public hearings before a cloud seeder is granted a permit.

One of the biggest problems with state regulation of weather modification is that the effects of weather modification commonly involve more than one state. For example, cloud seeding in the sky above Montana might later cause rain in North Dakota.

The following state governments, in alphabetical order, have significant websites about weather modification licensing and regulation:

- [Colorado](#)
- [North Dakota](#)
- [Oklahoma](#)
- [Texas](#)
- [Utah](#)

Most states in the USA have statutes about weather modification. Because there are so many statutes and because they change with time, I have chosen not to summarize state statutes in this essay. Most states have posted their current statutes on the Internet, so they are easily available. Readers of statutes should contact an attorney who is licensed to practice in their state for an interpretation of technical legal terms in the statutes.

The Federal statute 15 USC § 330 (1971) requires reporting of weather modification to the Secretary of Commerce. Federal Regulations that implement this statute are found at 15 CFR § 908.

3. Court Cases

It is important to know that decisions of trial courts in the USA are *not* published (with the exception of some federal cases and a very few cases in some state courts), so it is difficult to find opinions of trial courts. Even if they were published, an opinion of a trial court is *not* precedent that is binding on future trials.

Additionally, many appellate court cases in the USA are also *unpublished* and also can not be found conveniently.

Therefore, there is no convenient way to find *all* of the cases in the USA involving a specific topic or legal issue. However, the following list is what I found in May 1997 and September 2002 with a search of the comprehensive Westlaw ALLCASES database, plus what I found by following footnotes in law review articles.

I list the cases in chronological order in this essay, so the reader can easily follow the historical development of a national phenomenon. If I were writing a legal brief, I would use the conventional citation order given in the *Bluebook*. I cite articles and books in the (Author, year, page) format; complete bibliographic data is given below.

There are two basic ways that people in the USA can file litigation in court regarding weather modification:

1. Before the cloud seeding occurs, potential victims may apply to a court for an injunction prohibiting any future attempt at weather modification. Before an injunction can be issued, the plaintiff must be able to show an "irreparable harm" (i.e., destruction of something unique that can not be replaced) or "no adequate remedy at law" (i.e., money damages in either contract or tort litigation would not adequately compensate plaintiff).
2. After the allegedly modified weather causes damage to crops or buildings, the victims can sue the people who allegedly caused the modification in weather.

New York 1950

Slutsky v. City of New York, 97 N.Y.S.2d 238 (Sup.Ct. 1950).

New York City was conducting "experiments to induce rain artificially", in order to alleviate the "severe drought" that had diminished the City's water supply. The Plaintiff, Slutsky, sought an injunction to prohibit these experiments, because he feared the rain would interfere with his business, which was a country club and resort in Ulster County, north of New York City.

The trial court, in a terse opinion, denied the injunction and said:

Apart from the legal defects in plaintiffs' suit (since they clearly have no vested property rights in the clouds or moisture therein), the factual situation fails to demonstrate any possible irreparable

injury to plaintiffs.
97 N.Y.S.2d at 239.

The final paragraph of the opinion says:

Contrasted with plaintiff's unfounded speculations as to possible damage, the affidavits of the experts for the City show that the experiments have reached a stage where it might reasonably be expected that rainfall may be both induced and controlled. This court must balance the conflicting interests between a remote possibility of inconvenience to plaintiffs' resort and its guests with the problem of maintaining and supplying the inhabitants of the City of New York and surrounding areas, with a population of about 10 million inhabitants, with an adequate supply of pure and wholesome water. The relief which plaintiffs ask is opposed to the general welfare and public good; and the dangers which plaintiffs apprehend are purely speculative. This court will not protect a possible private injury at the expense of a positive public advantage. Since plaintiffs have shown neither a factual nor legal basis for the drastic relief that they seek, the motion for a temporary injunction is denied.

97 N.Y.S.2d at 240.

The parenthetical remark about "no vested property rights" is a totally unsupported conclusion. Nowhere in this terse opinion is any discussion of property rights, vested or otherwise. This terse opinion cites no cases, no statutes, no books, and no scholarly articles in legal journals. Furthermore, the promise of experiments to increase rainfall, which the court accepts as reality, was, in fact, highly speculative in 1950. Indeed, the judge properly referred to the attempts at rainfall enhancement as an "experiment" five times in one page. Despite what the judge said, there was a possibility that the plaintiffs' business might suffer from heavy rainfall, and there is also a possibility that the experiments would be *ineffective* in enhancing rainfall. Nonetheless, it was appropriate to balance the harms that might be suffered by one resort owner vs. ten million thirsty people in the City, and then rule in favor of the City. In my opinion, this judge reached the correct result, after mentioning the wrong reason (i.e., "no vested property rights"), no reasons (i.e., failing to cite any authority), and the right reason (i.e., the balancing of equities).

The opinion in this case was subsequently criticized by Judge MacPhail in Pennsylvania:

The court's language concerning vested property rights in clouds and moisture was *dicta*, unsupported by legal authority or reason and was not favorably received. See 34 Marquette Law Review 262.

Pennsylvania Natural Weather Assn. v. Blue Ridge Weather Modification Assn., 44 Pa. D. & C. at 757, 1968 WL 6708 at *6 (Pa.Com.Pl. 1968).

After following the citation to the *Marquette Law Review*, one finds that Comment (which was written by three students while in law school) says only the following about the *Slutsky* case:

... the court offers no substantial reason for its parenthetical statement that a property owner has "no vested property rights in the clouds or the moisture therein." Indeed it is not at all clear just what the court means by its statement, for while it is true that a landowner has no vested property right in the moisture or clouds while over another man's land, it does not necessarily follow that he has no rights whatsoever to the natural benefits which will accrue to him from the normal rainfall. Thus the *Slutsky* case, while making a rather categorical statement regarding the rights of property owners in the clouds overhead, actually throws little light upon the problem involved.

Paul Binzak, Richard P. Buellesbach, Irving Zirbel, Comment: "Rights of Private Land Owners as Against Artificial Rain Makers," 34 Marquette Law Review 262, 264-65, Spring 1951.

Oklahoma 1954

Samples v. Irving P. Krick, Inc., Civil Nrs. 6212, 6223, 6224 (W.D.Okla. 22 Dec 1954).

This is an *unreported* case that has been mentioned briefly in several law review articles. See, e.g., Grauer & Erickson (1956, p. 109), Oppenheimer (1958, p. 319), and Davis (1974, p. 413). This was apparently the first weather modification case in the USA to be presented to a jury.

Plaintiff alleged that cloud seeding by Krick caused a flood on 18-19 November 1953 in Oklahoma City. The jury returned a verdict for the defendant. Despite the immense importance of this case both to the meteorology community and to the developing area of weather modification law, the federal judge did *not* prepare a written opinion for this case.

Incidentally, Krick was the chairman of the meteorology department at California Institute of Technology from 1933 to 1948. That university abolished the entire meteorology department and fired Krick in 1948, apparently because Krick was spending too much time on his private consulting business that forecasted the weather for paying clients, and not enough time on scholarly research in atmospheric physics. (See the essay by Judith Goodstein, a historian of science at California Institute of Technology.) Krick was one of the most famous commercial cloud seeders in the USA during the 1950s and 1960s. Among other flamboyant statements, Krick claimed he could predict weather more than one year in advance, with approximately 80% accuracy, using proprietary technology that he had developed. I have the impression that most meteorologists who were familiar with Krick's work believed that he was unprofessional and a fraud.

Washington state 1956

Auvil Orchard Company, Inc. v. Weather Modification, Inc., Nr. 19268 (Superior Court, Chelan County, Wash. 1956).

This is an *unreported* case that has been mentioned briefly in several law review articles. See, e.g., Oppenheimer (1958, p. 319) and Davis (1974, p. 413).

Auvil was able to get a temporary injunction prohibiting cloud seeding for hail suppression. However, Auvil was unable to obtain a permanent injunction, because he was unable to prove that the cloud seeding had caused a flood.

Texas 1958-59

Southwest Weather Research, Inc. v. Duncan, 319 S.W.2d 940 (Tex.App. 1958), *aff'd sub nom. Southwest Weather Research v. Jones*, 327 S.W.2d 417 (Tex. 1959).

Southwest Weather Research was a commercial cloud seeding company that was attempting to suppress hail for the benefit of farmers in counties east of Jeff Davis County. A group of ranchers in