

DEPARTMENT OF NATURAL RESOURCES

EXHIBIT 1

**COLORADO WEATHER MODIFICATION RULES  
AND REGULATIONS**

**June 30, 2012**



# **RULES AND REGULATIONS FOR COLORADO WEATHER MODIFICATION**

## **DEPARTMENT OF NATURAL RESOURCES**

### **TABLE OF CONTENTS**

<b>Rule</b>	<b>Title</b>	<b>Pages</b>
1	Title	3
2	Authority	3
3	Purpose and Scope	3
4	Definitions	3
5	Application for a Permit	3-4
6	Required Information and Proof of Financial Responsibility	4-6
7	Publication of Legal Notice of Intent	6
8	Evaluating Permit Applications	6
9	Hearing Required	6
10	Duration of Permits	6
11	Target area Notification Required	6
12	Yearly Operational Plan Required	7
13	Reports	7-8
14	Weather Modification Activities Subject to Applicable Permitting and Regulation	8
15	Modification of a Permit and Best Management Practices	8
16	Compliance with American Society of Civil Engineers Standards Practices	8
17	Suspension of Weather Modification Operations	8-9
18	Suspension of Weather Modification Activities by Emergency Managers	9
19	Weather Modification Evaluations	9-10
20	Weather Modification Advisory Committee	10
21	Procedure for granting Emergency Permits	10-11
22	Severability	11
23	Effective Date	11

## **RULES AND REGULATIONS FOR COLORADO WEATHER MODIFICATION**

- Rule 1.** **Title:** The previous Colorado Weather Modification Rules and Regulations were adopted August 1, 1986, and are amended here under the same title (referred to herein collectively as the “Rules” or individually as “Rule”). These Rules supersede the August 1, 1986 Rules.
- Rule 2.** **Authority:** Section 36-20-107(1), C.R.S. (2011), empowers the Executive Director of the Department of Natural Resources (“Director”) to promulgate rules necessary to effectuate the purposes of the Weather Modification Act of 1972 (the “Act”). Section 36-20-107(3)(a), C.R.S. requires the Director to ensure that the Rules are up to date and consistent with the Act. The Director may delegate to the Director of the Colorado Water Conservation Board, or another designee, the authority to administer the Act, to issue permits, and to regulate weather modification activities permitted pursuant to the Act pursuant to section 36-20-108(3)(b) C.R.S. (2011).
- Rule 3.** **Purpose and Scope:**
- A. **Purpose.** The purpose of these Rules is to provide regulation of and standards for weather modification in Colorado in accordance with the legislative declaration provided by the Act, section 36-20-101, C.R.S. (2011), and pursuant to the legislative direction provided by section 36-20-107(3)(a). Rules for regulation of weather modification operations are of statewide concern to the state of Colorado and the Department of Natural Resources. The state of Colorado, through the Colorado General Assembly, recognizes the economic benefits that can be derived for the people of Colorado from weather modification, while minimizing possible adverse effects through implementation of proper safeguards and collection of accurate information. The Colorado General Assembly authorized the Director to issue permits applicable to weather modification operations pursuant to the Act, section 36-20-108(1), C.R.S. (2011). This direction is intended to ensure that weather modification operations implement proper safeguards and provide accurate information on operations.
- B. **Scope.** These Rules apply to all weather modification operations in the state of Colorado, including, but not limited to, those by individuals, corporations, local government agencies, regional government agencies, state government agencies, and federal government agencies.
- Rule 4.** **Definitions:** These Rules adopt the defined terms provided by section 36-20-104, C.R.S. (2011) of the Act. Further terms are defined as provided herein.
- Rule 5.** **Application for a Permit:**
- A. **Application for Permit.** An application for a weather modification permit must be submitted at least 45 days before the beginning date of proposed weather modification operation.

B. **Requirements for Operator.** The qualifications, education, and experience of any prospective Operator to engage in weather modification operations must be demonstrated to the Director pursuant to section 36-20-112(1)(g), C.R.S. (2011). An application for a permit must therefore include evidence of one of the following:

- (1) A minimum of four years of field experience in the management and control of weather modification operations or research; and
- (2) A degree in engineering, the physical sciences, or meteorology; or
- (3) Certification by the Weather Modification Association as a Certified Operator; or
- (4) Other training and relevant experience that the Director accepts as indicative of sufficient competence in the field of weather modification to engage in weather modification activities.

At least one such Operator shall be available at all times and days during weather modification activities for immediate consultation by the Director.

C. **Modification, Suspension or Revocation of Permit.** The Director may revise the terms of a permit if the operator is first given notice and opportunity for a hearing on the need for a revision and the Director determines the revision is necessary to protect the health or property of any person or to protect the environment. The Director may suspend or revoke a permit if it appears that the operator no longer has the qualification necessary for the issuance of the permit or has violated any provision of the Act after giving the operator notice and opportunity for a hearing pursuant to sections 36-20-119 and 36-20-120, C.R.S. (2011). While the Director may only issue one active permit for activities in any geographic area if two or more projects may adversely interfere with each other, the Director may issue more than one permit for activities in any geographic area if one of the permits becomes inactive due to a project sponsor's termination of a contract with a permit holder and the cessation of weather modification operations.

D. **Permit Fee.** A permit application or renewal must include the appropriate application or renewal fee designated by the Director pursuant to section 36-20-113, 114, C.R.S. (2011), as set forth in a policy discussed at a Board meeting and published on the Board website. The application fee is required of all applicants; including persons employed by commercial firms, government and non-profit agencies and should be sufficient to pay the direct costs of reviewing the permit application, holding public hearings and monitoring the Permitting Program.

E. **Commercial Fee.** Applicants for commercial weather modification operations must also pay a Commercial Fee. The amount of this Commercial Fee is 2% of the yearly contract between the permit holder and the operation sponsors. If the permit holder and operation sponsor are the same, then the Commercial Fee is 2% of the operation's yearly budget. The Commercial Fee shall be paid at the beginning of each operational season, or may be prorated to be paid half at the beginning of the operational season and half at the end of the season at the discretion of the Director. The Commercial Fee compensates for permitting, regulatory compliance and environmental monitoring functions performed by

the Director or his or her designee. The Director may waive the Commercial Fee in extraordinary circumstances.

**Rule 6. Required Information and Proof of Financial Responsibility:**

A. **Required Information.** The weather modification permit application must include the following information:

- (1) A description of the objectives of the proposed weather modification operation; and
- (2) The specific time period for the operation; and
- (3) A written description and map identifying the specific target area and the area reasonably expected to be affected by the operation; and
- (4) A description of how the operation will be carried out, including, but not limited to, the location of the office, weather data used, aircraft types, seeding devices and material, seeding rates; and
- (5) How the proposed operation is designed to provide economic benefit to the target area (applicable to commercial operations only); and
- (6) How the proposed operation is reasonably expected to benefit both persons living in the target area and the people of Colorado; and
- (7) How the proposed operation is scientifically and technically feasible; and
- (8) How the proposed operation is designed for developing the knowledge and technology of weather modification (applicable to research and development operations only); and
- (9) The potential risks that the proposed operation could cause, such as harm to land, water, people, health, safety, property and the environment, and the adequate safeguards proposed for use by the operator to prevent harm; and
- (10) How other weather modification operations and research projects (if any) could be affected adversely by the proposed operation; and
- (11) Any significant expected negative ecological impacts that may result from the operation, such as how precipitation patterns could be altered, how increased runoff would affect erosion, and the environmental impacts of any chemicals utilized in the operation; and
- (12) Provide scientific literature and documentation that the proposed form of weather modification is viable and likely to produce the intended effect.

B. **Proof of Financial Responsibility.** The application must also furnish proof of financial responsibility adequate to meet obligations reasonably likely to be attached to, or

result from, the proposed weather modification operation as required by section 36-20-112(c), C.R.S. (2011). Proof of financial responsibility may be shown by

evidence of a liability policy of at least \$1 million, or three times the value of the weather modification operation, whichever is greater, including proof that the insuring company is authorized to do business in Colorado, and a cancellation clause with a 30-day notice to the Director.

Above these minimum requirements above, Applicants should consider maintaining liability insurance against the effects of weather modification operations, also called consequential loss insurance, which is not normally a part of ordinary liability insurance.

- Rule 7. Publication of Legal Notice of Intent:** Applicants for a weather modification permit must publish a legal notice or notices of intent to modify weather in the counties to be affected by the weather modification operations, and/or any other newspapers required by the Director, including regional newspapers, pursuant to section 36-20-112(e), C.R.S. (2011) and in accordance with the timeline provided by section 36-20-104(7). The target area is defined as the area in which the operator desires to produce effects. Counties which may reasonably be expected to be affected by the operation include, at a minimum, those counties that are adjacent to the county (or counties) containing the target area. Applicants must use a form for legal notices approved by the Director. Affidavits provided by newspaper publishers, radio or television station managers, or sheriffs are sufficient proof of publication.
- Rule 8. Evaluating Permit Applications:** The Director shall evaluate applications for compliance with the criteria provided by section 36-20-112, C.R.S. (2011). The decision made will be to grant, deny, or grant the permit with additional terms and conditions.
- Rule 9. Hearing Required:**
- Hearing Prior to Permit Issuance or Renewal.** A public hearing is required prior to issuance or renewal of a weather modification permit pursuant to section 36-20-112(e), C.R.S. (2011) and held in accordance with section 36-20-108(3)(b). The Director or his or her designee will record the hearing, and will consider public input, as well as all other information presented at the hearing to evaluate applications.
- Rule 10. Duration of Permits:** Permits shall be granted for a maximum of one calendar year, except for ground-based winter cloud seeding, which may have a duration of five years, and may be renewed for five years or ten years, pursuant to section 36-20-108(1), C.R.S. (2011). Consistent with section 36-20-114(2), permits granted for one calendar year may be renewed on an annual basis for four additional calendar years without a public hearing providing the permitted weather modification operation has not materially changed and the permit holder has satisfied all record keeping and reporting requirements.
- Rule 11. Target Area Notifications Required:** The permit holder must notify the local National Weather Service weather forecast office, Colorado Avalanche Information Center (“CAIC”), the County emergency managers, and the CSU Colorado Climate Center, unless

otherwise requested by the Director prior to each season of weather modification operations. The permit holder must document notification in annual reports.

**Rule 12. Yearly Operational Plan Required:** The permit holder must submit an annual Operational Plan to the Director. The Operational Plan must include the following information:

- (1) A map depicting the target area and weather modification equipment locations; and
- (2) An unlocked spreadsheet including the latitude and longitudinal directions of each weather modification equipment location; and
- (3) Evidence of compliance with the notifications required by Rule 11; and
- (4) The Operator's current contact information; and
- (5) Declaration of the weather modification operational suspension criteria; and
- (6) Acknowledgement of the Director's suspension criteria to be followed during the year.

**Rule 13. Reports:** The Director requires the permit holder to maintain and submit the following reports pursuant to section 36-20-117, C.R.S. (2011):

- A. **Daily Log:** The permit holder must maintain a current, daily log shall at the operation office. This log must be made available for inspection by the public. The daily log must include the date, time of each period of operations, rate of dispersion of seeding agent and total amount of seeding agent dispersed. The Director encourages automated logging of operations over manual logging of operations.
- B. **Annual Reports:** The permit holder must compile annual reports in accordance with section 36-20-117(3), C.R.S. (2011). The permit holder must provide the Director with a written annual report that evaluates the weather modification operation within 90 days of concluding its operations season.
- C. **Additional Record-Keeping for Aircraft-Based Operations:** In addition to the above record-keeping requirements, any person conducting a weather modification operation with an operational target area that includes any part of Colorado that employs aircraft must record and maintain the following information:
  - (1) The date; and
  - (2) Time period (in minutes); and
  - (3) Rates of dispersion for seeding agent for each flight; and
  - (4) Total amount of seeding agent dispensed;

- (5) Description of each flight track logged in such a manner as to allow a complete and accurate reconstruction of the run and identified at the beginning and ending of each flight by radial and distance from a standard reference point, ground fixes in statute miles from a nearby town or landmark, or geostationary positioning system (“GPS”) location; and
- (6) Other information required by the Director.

**Rule 14. Weather Modification Activities Subject to Applicable Permitting and Regulation:**

Permit holders are subject to all applicable local, state, and federal permitting and regulation. Permit holders should be aware that all cloud seeding operations must be reported to the National Oceanic and Atmospheric Administration (Public Law 92-205).

**Rule 15. Modification of a Permit and Best Management Practices:** The Director may revise a weather modification permit in accordance with section 36-20-115, C.R.S. (2011), including the addition or a revision based on best management practices, operational criteria, or as otherwise necessary to protect the health or property of any person or to protect the environment. The permit holder may request a hearing regarding permit revisions pursuant to section 36-20-112(e), C.R.S. and held in accordance with section 36-20-108(3)(b).

**Rule 16. Compliance with American Society of Civil Engineers Standard Practices:** The Director may require permit holders to comply with applicable American Society of Civil Engineers Standard Practices documents to design, operate, and evaluate weather modification operations.

**Rule 17. Suspension of Weather Modification Operations:**

**A. Ground-Based Winter Cloud Seeding:** The permit holder must suspend ground-based winter cloud seeding operations when the following conditions are in the target area:

- (1) **Snow Water Equivalent Thresholds.** Weather modification operations must be suspended at any time the snowpack water equivalents exceed the following: 175% of average on December 1st, 175% of average on January 1st, 160% of average on February 1st, 150% of average on March 1st and 140% of average on April 1<sup>st</sup>. The Director or his or her designee will determine where and how snowpack water equivalents are to be measured, including at selected “SNOTEL” sites. The Director or his or her designee may permit weather modification operations to continue in a portion of the operation target area where snowpack water equivalents are below these suspension criteria percentages, if the operation will not impact the area where snowpack water equivalents are above these suspension criteria percentages. These thresholds are designed to keep the seeding effect to within the realm of natural variability of the local climate as measured at each SNOTEL station.
- (2) **Avalanche Hazard Levels.** Weather modification operations may be suspended by the Director due to high avalanche hazard levels, and must be suspended by the permit holder due to extreme avalanche hazard levels for highway corridors, as



determined by the Colorado Avalanche Information Center (CAIC). The CAIC works in coordination with the Department of Transportation and National Weather Service to determine avalanche hazard levels. The permit holder must monitor CAIC avalanche hazard levels, and coordinate with the Director and CAIC to determine whether suspension of operations is warranted by high avalanche hazard levels.

- (3) National Weather Service Forecasts. The permit holder must suspend weather modification operations when the National Weather Service forecasts the following conditions for the target area: a warm winter storm with a snow level above 8,000 feet elevation and rainfall below that elevation that may result in local flooding or potential flood conditions, including a flood or flash flood watch, warning or advisory that is in effect for drainages located on or near the cloud seeding operations area.

B. **Aerial Summer Cloud Seeding:** The permit holder must suspend aerial summer cloud seeding operations when the National Weather Service has issued a flash flood warning, storms are producing a funnel cloud or tornado, or the operational meteorologist observes any condition that warrants temporary suspension of the program. The permit holder must suspend winter aerial cloud seeding operations according to the suspension criteria of Rule 17.A.

C. **Other Weather Modification Operations:** The Director may determine and implement suspension criteria for other types of weather modification operations, as necessary. For example, hail cannon weather modification operations must be confined to a small localized area directly over the target area, and limited to periods of heavy rain and hail tracking directly toward and over the target area.

**Rule 18. Suspension of Weather Modification Operations by Emergency Managers:** Emergency managers may require the immediate temporary suspension of weather modification operations for any reason.

**Rule 19. Weather Modification Evaluations:** The Director desires to promote continuous research, development, and evaluation of permitted programs. Permit holders shall submit periodic evaluation proposals to the Project Sponsors. Periodic is defined as at least once during a five-year permit or twice during a ten-year permit. A periodic evaluation should be outside of the normal annual reporting methods. Evaluations that are peer reviewed and published in journals can count as “independent” evaluations. The Director recommends the following list of data and types of studies for use in the evaluation.

A. The following are examples of data for evaluations:

- (1) Standard meteorological data from surface weather stations;
- (2) Radar and other remote sensing data, cloud physics data;
- (3) Streamflow data;
- (4) SNOTEL and snow course data;
- (5) Hail pad data, upper air data;
- (6) Upper air data;

- (7) Precipitation gauge;
- (8) Modeling simulations;
- (9) Trace chemistry data from snow sampling; or
- (10) Ice nucleus data

B. The following are examples of types of evaluations:

- (1) Predictive and/or diagnostic cloud modeling;
- (2) Modeling of transport and diffusion of seeding material;
- (3) Airflow, temperature, and liquid water measurements in the target area;
- (4) Target versus control analysis of precipitation or snow water;
- (5) Trace chemistry analysis in snowpack to assess targeting;
- (6) Precipitation gauges comparisons;
- (7) Aircraft cloud microphysical studies;
- (8) Plume tracking of cloud seeding aerosols or tracers;
- (9) Analysis of precipitation from existing projects that employ a randomized design in their seeding operations; or
- (10) Other evaluations outlined in various published documents related to the conduct of weather modification projects.

**Rule 20. Weather Modification Advisory Committee.**

A. **Formation of Weather Modification Advisory Committee:** Pursuant to section 36-20-108, C.R.S. (2011) the Director may create a weather modification advisory committee. Members of this committee shall be appointed by the Director, and serve for a period of time as determined by the Director.

B. **Duties of the Weather Modification Advisory Committee:**

- (1) Advise the Director on applications for weather modification permits; and
- (2) Advise and make recommendations concerning legislation, policies, administration, research, and other matters related to cloud seeding and weather modification activities to the Director; and
- (3) Other duties as determined by the Director.

**Rule 21. Procedure for granting emergency permits.** Notwithstanding the foregoing, the Director may exempt weather modification operations from these requirements, and others, as provided by section 36-20-109, C.R.S. (2011), including for activities of an emergency nature for protection against fire, frost, hail, sleet, smog, fog, or drought. The procedure for issuing an emergency permit is as follows:

A. A permit may be granted on an emergency basis through the waiving of one or more of these rules when evidence is presented that clearly defines the situation as an emergency.

B. Upon presentation of evidence satisfactory to the Director that an emergency condition exists or may reasonably be expected to exist in the very near future that may be alleviated

or overcome by weather modification activities, the Director shall issue a permit for those activities.

- C. Within 10 days after the granting of an emergency permit, and if the permittee desires to continue the permitted weather modification activities, the permittee shall publish a legal notice of intent to modify weather as provided by Rule 7 herein. In addition to the requirements of Rule 7, the permittee shall describe the objectives of the emergency action, the success to date, and the future plans under the permit. The Director will evaluate whether to revoke the emergency permit, modify it, or permit its continued operations as soon as is practical after the public hearing on the weather modification activities.

**Rule 22. Severability:** If any portion of these Rules is found to be invalid, the remaining portion of the Rules shall remain in force and in effect.

**Rule 23. Effective Date:** June 30, 2012.