Solar Radiation Management, Research Governance, and Weather Modification Law

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Climate Intervention Law
Oct. 2, 2019
Domestic laws and governance of solar radiation management research

- Baseline: a network of federal and state environmental, health & safety, and liability laws already provide an ad hoc governance network for research on reflective radiation strategies

- From a descriptive perspective, do these laws and regulations – all designed to apply to different circumstances and risks from reflective radiation research – operate in coherent and desirable ways when applied to that research
  - Transparency
  - Effectiveness
  - Consistent outcomes
  - Resiliency against manipulation
Research Governance

- Drawing the line between research vs application

- Federal and state laws (especially environmental laws) provide some space and flexibility for research projects
  - Substantive legal requirements still apply in background; the research exemptions apply within them
  - Examples:
    - Experimental Use Permits under FIFRA
    - Alternative Compliance Methodologies under CAA
    - Testing consent orders under TSCA
    - Research, Development and Testing Permits for Hazardous Wastes (40 C.F.R. 270.65)

- No existing research exemption in federal environmental laws squarely applies to solar reflective radiation research
Domestic laws and SRM governance
NWMA Notification and Liability Mandates

• National Weather Modification Policy Act of 1976
  – Broad definitions, particularly of “weather modification”
  – Mandatory 10-day prior notice, with 45-day follow-up
  – Record-keeping requirements and disclosure
  – Specific notice required for abnormal risks
  – $10,000 potential fine per violation

• NWMA does not distinguish between research and commercial use of weather modification

• Enforcement concerns

• State laws differ on weather modification permitting
The National Weather Modification Act and Solar Radiation Management Research

• NWMA section 330(3) defines “weather modification” to include

  Any activity performed with the intention of producing artificial changes to the composition, behavior, or dynamics of the atmosphere.

• NOAA’s implementing rules (15 C.F.R. 908.3) require reporting of

  [m]odifying the solar radiation exchange of the earth or clouds, through the release of gases, dusts, liquids, or aerosols into the atmosphere
NWMA definitions and MCB research

- NOAA’s rules to implement the NWMA (15 C.F.R. 908.3(a)(1)) also may separately affect marine cloud brightening and cirrus cloud modification research

- Must report the seeding or dispersing of any substance into clouds or fog, to alter drop size distribution, produce ice crystals or coagulation of droplets, alter the development of hail or lightning, or influence in any way the natural development cycle of clouds or their environment;
Weather Modification Project Reports

Publication History & Scope

In the late 1940's and 1950's many deemed "the deliberate or the inadvertent alteration of atmospheric conditions by human activity", also known as weather modification, as a promising science of the future. Currently, the most common form of weather modification is cloud seeding, which increases rain or snow, usually for the purpose of increasing the yield of agricultural crops.
Complete in accordance with instructions on reverse and forward copy:

TO: National Oceanic and Atmospheric Administration  
Office of Oceanic and Atmospheric Research  
1315 East-West Highway SSMC-3 Room 11216  
Silver Spring, MD 20910

Form Approved: OMB No. 0648-0025 Expires 12/31/2007

NOAA FORM 17-4  U.S. DEPARTMENT OF COMMERCE  
(4-81)  NAT’L OCEANIC AND ATMOSPHERIC ADM.  
INITIAL REPORT ON WEATHER MODIFICATION  
ACTIVITIES (P.L. 205, 92ND. CONGRESS)

1. PROJECT OR ACTIVITY DESIGNATION, IF ANY  
San Gabriel Mountains

2. DATES OF PROJECT  
a. DATE FIRST ACTUAL WEATHER MODIFICATION  
   ACTIVITY IS TO BE UNDERTAKEN  
   12/15/2015

   b. EXPECTED TERMINATION DATE OF WEATHER  
   MODIFICATION ACTIVITIES  
   04/15/2016

3. PURPOSE OF PROJECT OR ACTIVITY  
Increase precipitation.

4. (a) SPONSOR  
NAME  
Keith Hala

   AFFILIATION  
Los Angeles County Department of Public Work

   STREET ADDRESS  
900 Fremont St.

   CITY  
Alhambra  
STATE  
CA  
ZIP CODE  
91803

4. (b) OPERATOR  
NAME  
Don A. Griffith

   AFFILIATION  
North AmericanWeather Consultants (NAWC)

   STREET ADDRESS  
8180 S. Highland Dr., Ste. B-2

   CITY  
Sandy  
STATE  
UT  
ZIP CODE  
84093

5. TARGET AND CONTROL AREAS (See Instructions)  

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>SIZE OF AREA</th>
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<tbody>
<tr>
<td>San Gabriel Mountains north of</td>
<td>~800 SQ.MI.</td>
<td>Big Bear, Lk. Arrowhead, east</td>
<td>N.A. SQ.MI.</td>
</tr>
<tr>
<td>Los Angeles</td>
<td></td>
<td>of target area.</td>
<td></td>
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6. DESCRIPTION OF WEATHER MODIFICATION APPARATUS, MODIFICATION AGENTS AND THEIR DISPERSAL RATES, THE TECHNIQUES EMPLOYED, ETC. (See Instructions)

Six manually operated silver iodide ground generators will be used; each emitting 8 grams of AgI/hr. Four remotely operated ground-based silver iodide flare trees. Each flare emits 15 grams of seeding material. Generators and flare trees activated when storm conditions meet...
U.S. Laws and SRM research governance

Liability Principles

• Tort liability
  – Tort liability risks for reflective radiation field research – causation, preemption/displacement, state law options
  – Prior example: nanoscale material research liability
  – Complications: liability shields under state weather modification laws, state tort reform statutes, sovereign immunity, SLAPPs

• Insurance and risk management – exclusions from coverage; environmental impairment liability coverage