SOME COMMENTS ON WEATHER MODIFICATION REPORTING ACT REQUEST FOR INFORMATION (NOAA-OAR-2024-0091)

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These comments are Tom DeFelice's opinion based on his academic, professional and non-professional experiences. They do not necessarily reflect those of any person he knows or has known, nor his current or former employers, organizations or other entities

1.0 INTRODUCTION

The National Oceanic and Atmospheric Organization (NOAA) Oceanic and Atmospheric Research (OAR) was tasked with soliciting public comment on a petition for rulemaking to amend NOAA's reporting regulations under the Weather Modification Reporting Act 15 CFR part 908 (https://www.ecfr.gov/current/title-15/part-908). NOAA was particularly interested in:

1. How NOAA should update 15 CFR part 908 (https://www.ecfr.gov/current/title-15/part-908) reporting requirements to account for solar radiation modification experiments.
2. What reporting requirements NOAA should include regarding potential and/or measured environmental impacts of weather modification experiments given the state of the science and current detection capabilities.
3. The spatial scale of weather modification experiments and their intended effects for which NOAA should request in submitted reports.
4. Whether, under existing statutory authorities, NOAA should pursue a broader regulatory strategy for solar radiation modification research and experimentation.

NOAA indicated it would consider public comments received to determine whether to proceed with the petition's requested revisions. NOAA will publish an updated 15 CFR part 908 in the Federal Register.

2.0 DISCUSSION

Some thoughts related to the requested information items are highlighted.

1. How NOAA should update 15 CFR part 908 reporting requirements to account for solar radiation modification experiments

NOAA should not add reporting requirements for solar radiation modification experiments to 15 CFR part 908. Solar Radiation Modification or modification of incoming solar radiation (insolation) has very little if anything to do with cloud seeding or weather modification.

2. What reporting requirements NOAA should include regarding potential and/or measured environmental impacts of weather modification experiments given the state of the science and current detection capabilities.

Current reporting activities in the US and abroad must continue. The reporting process needs to be standardized. Some operational weather modification companies have expressed their concerns and provided relevant inputs. In addition to current reporting requirements, weather modification operations and research activity reporting requirements must at least include:

- An Environmental Impact Assessment and report.
- Target area size and shape, Operational Area (if not already reported; See below)
- Seeding agent used, how (i.e., Flare, solution via ground or airborne including UAS/UGV)
- Seeding Mode (airborne, ground), generator/flare type and numbers used.
- Seeding agent components in order of high to low or trace concentration including "filler(s)".

- Have a demonstrated active Public Information/ Outreach Plan before project starts.
- Seeding suspension criteria plan. The reporting must include times when criteria were not met, met, or were exceeded during operations, experiments etc., explain why, if seeding stopped and if stopped seeding when.
- If uncrewed systems (e.g., UAS/UGV) were used; add demonstrated evidence that FAA/ DOT regulations were followed throughout.
- A consistent mechanism to ensure reporting is completed and all contractors are compliant.
- Request observation types and area covered (e.g., Meteorologic, soil, hydrologic, land cover/ land use, soil moisture/temp. profiles and network name(s) or site specific for each project).

3. The spatial scale of weather modification experiments and their intended effects for which NOAA should request in submitted reports.

- The weather modification project spatial scale is the area covered by the target area, and the operations area. One might consider adding the area covered by possible downwind effects (DeFelice et al. 2014).
- The seeding material dispersal via aircraft is applied on sub-cloud scales and the seeding material dispersal scale via ground generators/flare trees is applied on sub-cloud to area scales.

4. Whether, under existing statutory authorities, NOAA should pursue a broader regulatory strategy for solar radiation modification research and experimentation.

I do think Solar Radiation Modification and geo-engineering or like technique research and development should be attached to a new statutory authority, or at least a new Part under Title 15. Solar radiation modification activity or geoengineering and other like techniques, including those I first read about in Hess (1974), do not belong under Weather Modification or cloud seeding.

I do see the need to clarify what Solar Radiation Modification is and what its reporting requirements should be. But not at the expense of weather modification.

- Solar Radiation Modification reporting could proactively avoid a global scale catastrophic event, i.e., 'nuclear winter' (e.g., https://en.wikipedia.org/wiki/Nuclear_winter)
- Cloud seeding technologies do not modify solar radiation, they do enhance the efficiency of our hydrologic cycle.
- Reporting could yield expanded salient information to assess the potential impacts and risks of Solar Radiation Modification activities.
- Assessing the impacts and risks of Solar Radiation Modification will:
    * Clarify what Solar Radiation Modification is.
    * Establish a proactive framework to guide the application of Solar Radiation Modification or similar techniques (i.e., geoengineering).

The Weather Modification Reporting Act 15 CFR part 908 (https://www.ecfr.gov/current/title-15/subtitle-B/chapter-IX/subchapter-A/part-908) was updated as of December 26, 2024 to include reporting Solar radiation intensity modification. Apparently, they feel geoengineering techniques such as modifying the solar radiation intensity are weather modification techniques if conducted as weather modification activity, and shall be subject to reporting, along with reporting modifying the characteristics of land or water surfaces by dusting or treating with powders, liquid sprays, dyes, or other materials; releasing electrically charged or radioactive particles, or ions, into the atmosphere; Applying shock waves, sonic energy sources, or other

explosive or acoustic sources to the atmosphere; using lasers or other sources of electromagnetic radiation, and solar radiation modification activities are not seen as being conducted as a weather modification activity. Hence, they do not need to be reported at all, despite their ability to threaten national security. Solar Radiation Modification and like techniques and those named in this paragraph are not weather modification techniques. Perhaps this may change after,

> (A) focused multi-disciplinary R&D (e.g., physical, chemical, biological, geologic, sociologic, economic) on developing/ identifying their theoretical basis.
>
> (B) mapping theory (A) to all atmospheric phenomena motion or time scale(s)
>
> (C) accounting for the interaction between where the technique is applied and its surroundings
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> (D) reaffirming results in (B) and (C) and then employing a benefit-to-cost analysis.

3.0 CONCLUDING REMARKS

The Weather Modification Reporting Act 15 CFR part 908 (www.ecfr.gov/current/title-15/subtitle-B/chapter-IX/subchapter-A/part-908) was updated as of December 26, 2024 to include reporting of solar radiation intensity modification activities. Apparently, releasing electrically charged or radioactive particles, or applying shock waves, sonic energy sources, other explosive or acoustic sources, or using lasers or other sources of electromagnetic radiation to or in the atmospheric are not considered reportable. Those implementing said activities would not see such as weather modification activities. NOAA OAR should have recommended a new “Part” of Title 15 for solar radiation modification and the said geo-engineering techniques.

4.0 REFERENCES

DeFelice, T. P., J. Golden, D. Griffith, W. Woodley, D. Rosenfeld, D. Breed, M. Solak, and B. Boe, 2014: Extra area effects of cloud seeding - An updated assessment. *Atmospheric Research*, **135–136**, 193–203, https://doi.org/10.1016/j.atmosres.2013.08.014.

Hess, W. N., 1974: Weather and climate modification. Wiley, 842pp.