



# Cloud Seeding Program

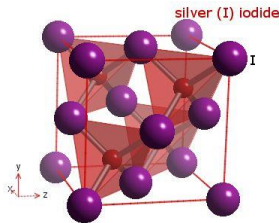
## Environmental Considerations | Silver Iodide (AgI)

### Is Cloud Seeding (CS) with Silver Iodide (AgI) safe for humans, ecosystems, and the environment?

Yes.

### How do we know?

The composition and physical characteristics of the seeding material, AgI, limits its ability to become harmful in the natural environment.



- AgI is an inorganic compound that is chemically inactive in the *natural environment*. . . What does that mean?
  - o Considered insoluble in water → cannot not readily dissolve in water and separate from iodide (disassociate) to become free silver (Ag<sup>+</sup>)
  - o The ability of AgI to dissolve (*its "solubility"*) in water is close to that of Quartz (white sand).
- The quantity of seeding material used to conduct CS (measured in grams) is microscale when compared to background levels of Ag<sup>+</sup> in the *natural environment*.
  - o A particle of AgI released into the atmosphere for CS could be compared in size to a particle of smoke. This small amount of material is spread out over large geographical areas for short durations (minutes to hours) further diluting the potential for accumulation.

### What research has been conducted?

More than 20 comprehensive studies and data reviews of the environmental considerations for use of AgI in CS operations all concur that there is currently no evidence of adverse effects to human health or the environment from the use of AgI from CS.

- 2010 | Idaho Department of Environmental Quality (IDEQ) conducted literature review on CS with respect to water and air quality. **IDEQ determined that it is unlikely that CS would cause a detectable increase in silver concentrations in the target seeding area or pose a chronic effect to sensitive aquatic organisms.** It was determined that an air quality screening permit was not needed based on screening thresholds.
- 2013 | the Environmental Epidemiology Program (EEP) under the Utah Department of Health received a request for technical assistance regarding the potential health effects of cloud seeding with AgI. . . due to facts presented and **"the relatively low toxicity of silver in humans, the EEP concludes that silver from cloud seeding projects is not expected to harm people's health."**
- The Wyoming Weather Modification Pilot Project (WWMPP) conducted trace chemistry analysis to understand Ag<sup>+</sup> concentrations in the target basin

Trace chemistry analyses of snow, water, and soil samples have shown a **negligible environmental impact from seeding operations**

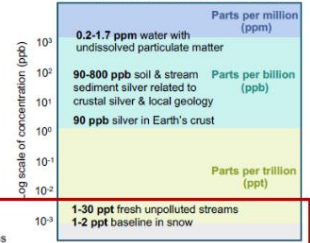


Trace chemistry measures amounts of chemicals in such small concentrations that clean gear and clean procedures are required

WWMPP:  
4-6 ppt baseline in snow  
1-36 ppt baseline in streams

**Far less than would be expected from other (background) sources of silver**

#### Values of Silver Concentration



- Australia Natural Resource Commission on a review of data from seeded watersheds: “Our review of Snowy Hydro’s analysis of data from its environmental monitoring over the first phase of the trial (2004 to 2009) found that it provides no evidence that the trial has had adverse environmental impacts over this period. The analysis provides no evidence of accumulation of silver iodide or indium trioxide in sampled soils, sediment, potable water or moss in the areas being tested. It also provides no evidence of impacts on mountain riverine ecosystems or snow habitats. In addition, it detected no difference between the concentrations of ammonia and nitrogen oxides in seeded and unseeded snow. “
- 2015| Boise State University and Heritage Environmental conducted a literature review on Silver toxicity: “Silver iodide has been used in weather modification programs for over sixty years... toxic effects are highly unlikely. Environmental sampling has found no evidence of adverse effects on wildlife or silver accumulating at detectable levels above background in soils, streams, or aquatic species in seeded areas. There are no documented cases of silver toxicity in the environment from any source of anthropogenic silver release.”

## 7 References

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