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## Perchlorate in the United States. Analysis of Relative Source Contributions to the Food Chain

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### Abstract:

Perchlorate has been considered by some a potential threat to human health, especially to developing infants and children because it may inhibit iodide uptake by the sodium iodide symporter (NIS) of the thyroid. In the United States, during the last several decades, environmental perchlorate has had three recognized sources stemming from (a) its use as an oxidizer (including in rocket propellants), (b) its presence in Chilean nitrate fertilizer (CNF), and (c) natural production. An analysis of the relative source strengths and how they may influence entry into the food chain has not been conducted. Averaged over the last ~60 years, we estimate that the source strengths have been (a) 10.6, (b) 0.75, and (c) 0.13-0.64 Gg/y for the United States as a whole. Of this, while (b) and (c) represent actual dispersed amounts, the figure in (a) is the amount of perchlorate produced and only a fraction ( $f$ ) of it has been dispersed and often in a more localized fashion. In addition, dispersal of (b) has taken place only over agricultural land. Considering that the total land area in the United States is  $5.5\times$  the arable land area, in terms of incorporation into the food chain, the figure cited in (b) has a proportionately greater impact. Most estimates of  $f$  will thus suggest that over the considered period, the contribution of CNF to incorporation of perchlorate in the food chain has likely been comparable to oxidizer perchlorate, with natural production being a lesser source. Fireworks presently constitute a potentially important source of increasing importance but a quantitative impact cannot yet be assessed.

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