Neutrino observatories in high-pressure salt caverns

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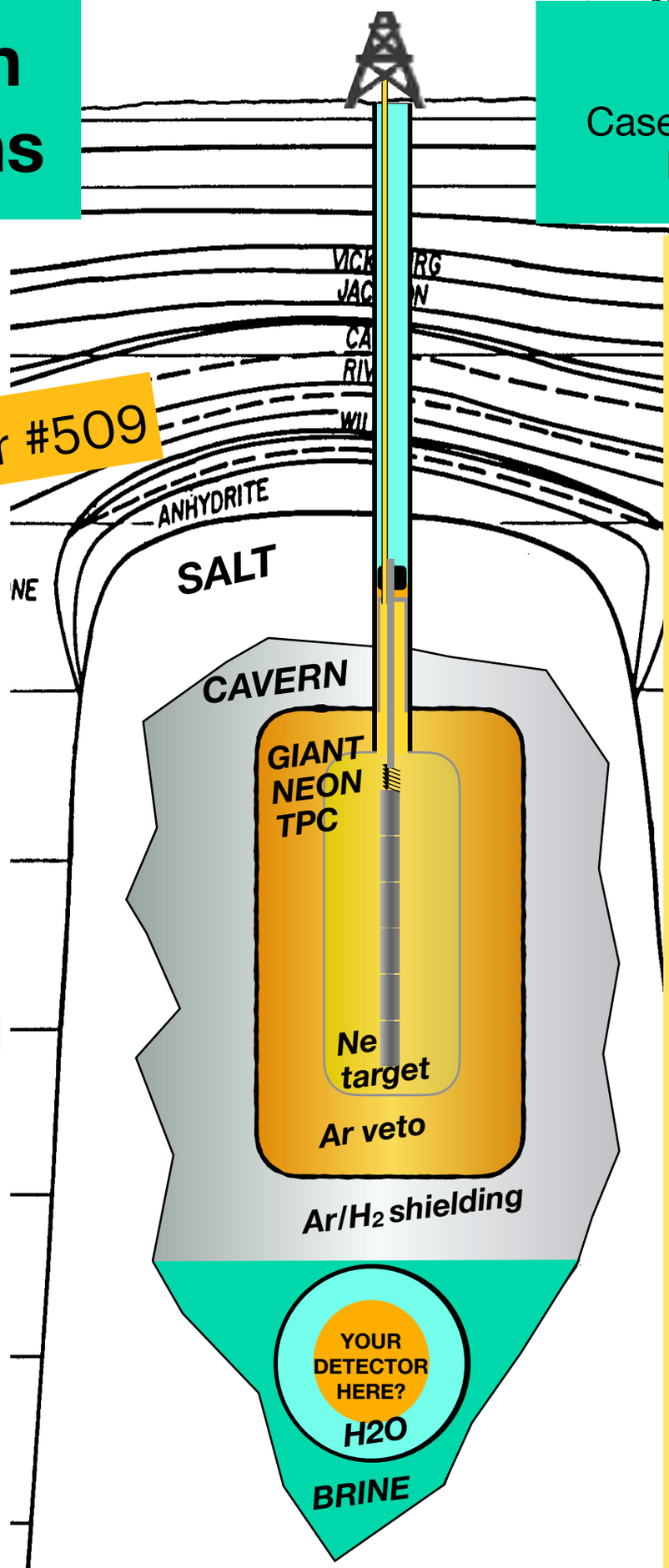
- Ultra-low-cost underground space can be made in solution mined salt caverns
  - Costs ~ $20/m^3
  - Volumes to 2x10^6 m^3
  - Depths 500-3000m
- Can we do experiments in them?
  - Pros: vast space, low U/Th/K, no explosion hazards, many sites
  - Cons: Experiment has to fit down a narrow well
  - Pro or con?: normally flooded and pressurized
- Current focus: spherical and cylindrical gas TPCs
  - Detector, veto, and shielding balloons are lowered into the cavern and inflated
  - Seeking collaborators & funding

see Poster #509



Case Underground Salt Observatory

Proposal:
- 10-15m cavern
- 12" well bore
- 600m depth (60 bar)
- same salt as IMB

CUSO physics:
- Ton-scale He/H_2 spherical TPC for light dark matter
- R&D, radioassay

Larger-cavern physics:
- kT-scale Ne (solar ν)
- kT-scale H_2 ($\bar{\nu}$, DM)
- 10t-scale Xe gas
- Low pressure TPCs?
- Water Cerenkov?

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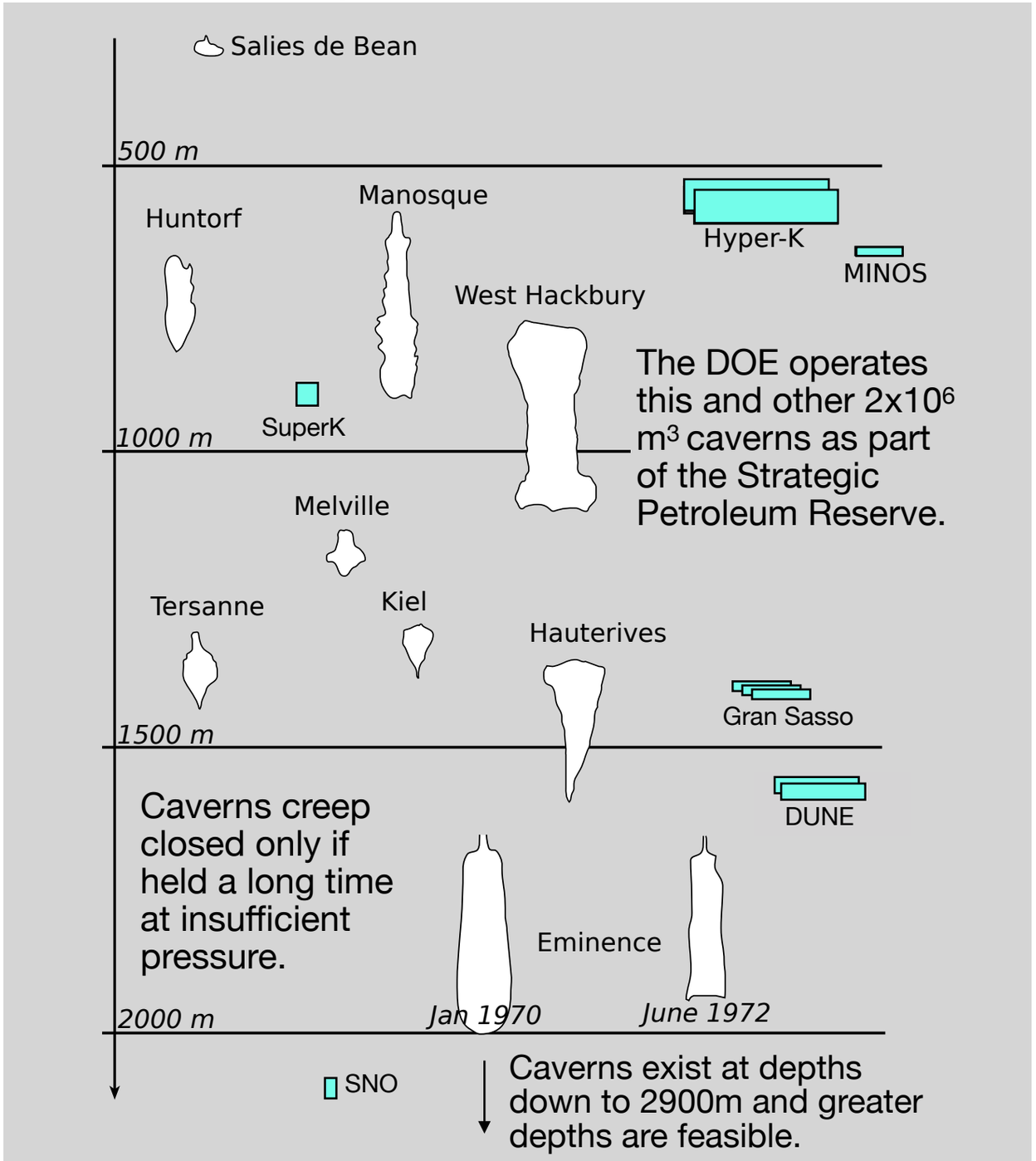
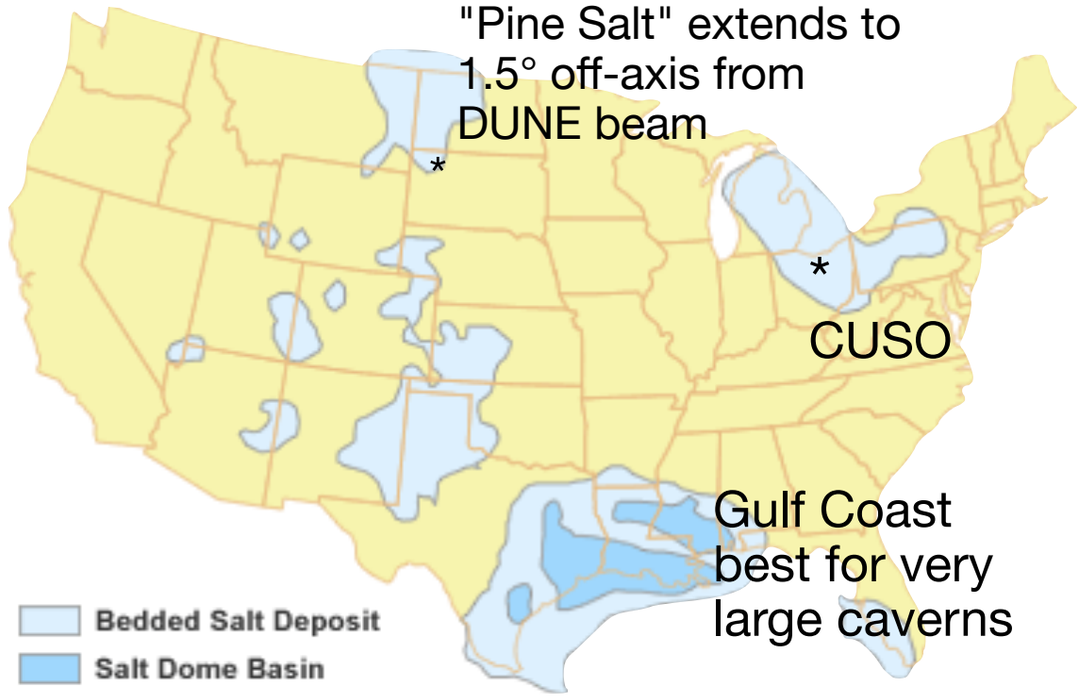
50 years of industry & DOE experience with solution mining; 100% standard processes



The DOE operates this and other 2×10^6 m^3 caverns as part of the Strategic Petroleum Reserve.

Caverns creep closed only if held a long time at insufficient pressure.

Caverns exist at depths down to 2900m and greater depths are feasible.



Wellhead of a solution-mined cavern producing industrial salt in Seville, OH