

# Nuclear Materials Management

*H Canyon and HB Line Processing*

*K Area Plutonium Storage*

*L Area Spent Fuel Storage*

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*Briefing for the DOE EM Robotics Team*

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# Agenda

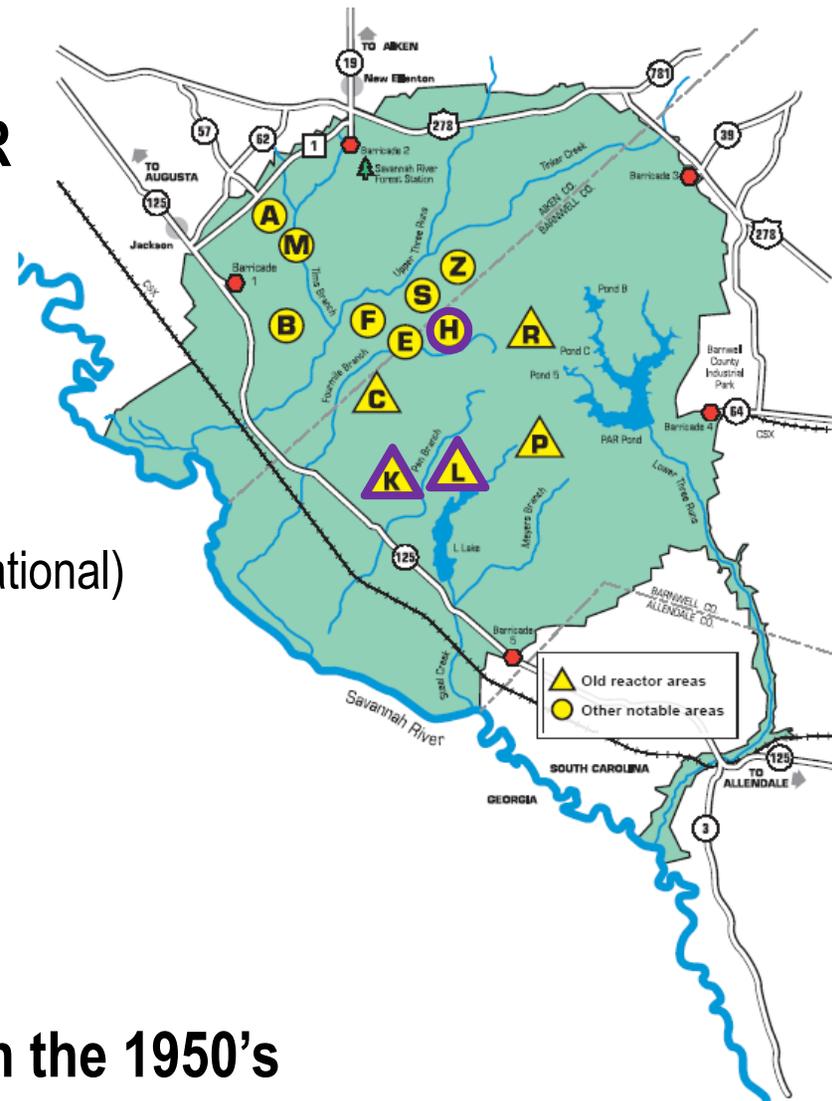
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- **Overview of facilities and possible application for advanced robotics**
  - H Canyon
  - HB Line
  - L Area
  - K Area

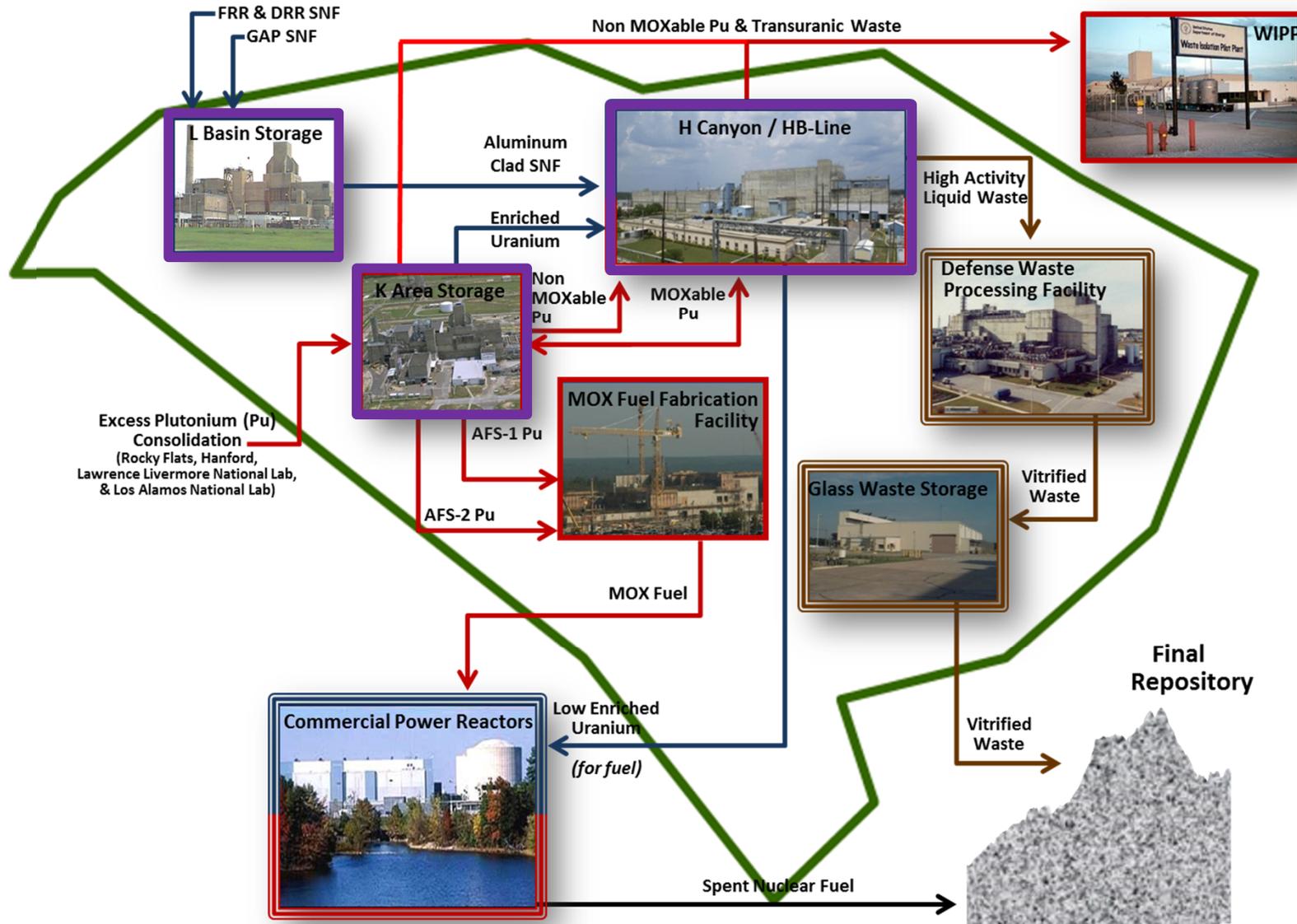


# Savannah River Site

- 310 square miles
- Major site contractors: SRNS, SRR
- Located on site:
  - Savannah River National Laboratory
  - 5 reactor areas (not operational)
    - *Materials Storage Facility (K Area)*
    - *Spent Fuel Storage (L Area)*
  - 2 chemical separations facilities (1 operational)
    - *H Canyon*
    - *HB Line*
  - 2 waste storage tank areas
  - 2 waste processing facilities
  - Tritium facility
  - MOX Fuel Fabrication Facility
- Many facilities were constructed in the 1950's



# Nuclear Materials Disposition Process

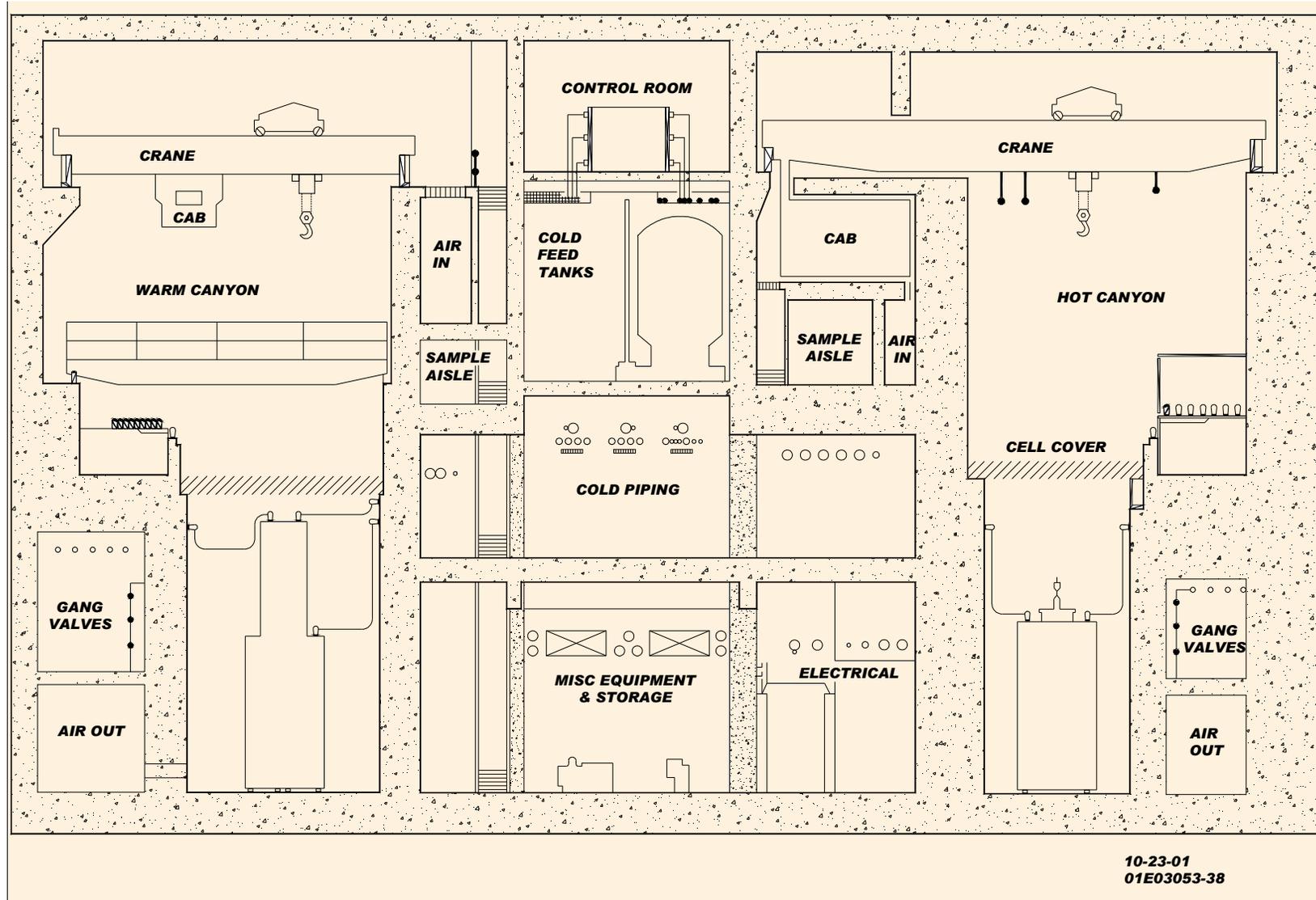


## H Canyon

- **Built between 1951 and 1954  
And began operating in 1955.**
- **Recovers uranium from spent reactor fuels.**
- **Also has recovered Neptunium and Plutonium.**
- **About 1000' x 120' x 75' .**
- **Two canyons – Hot and warm each divided into 18 sections.**
- **No entry permitted into the Hot Canyon due to radiation rates and limited entries into the Warm Canyon.**
- **All work in canyons performed by overhead cranes.**
- **Use of nitric acid in processing has degrade concrete in some areas.**

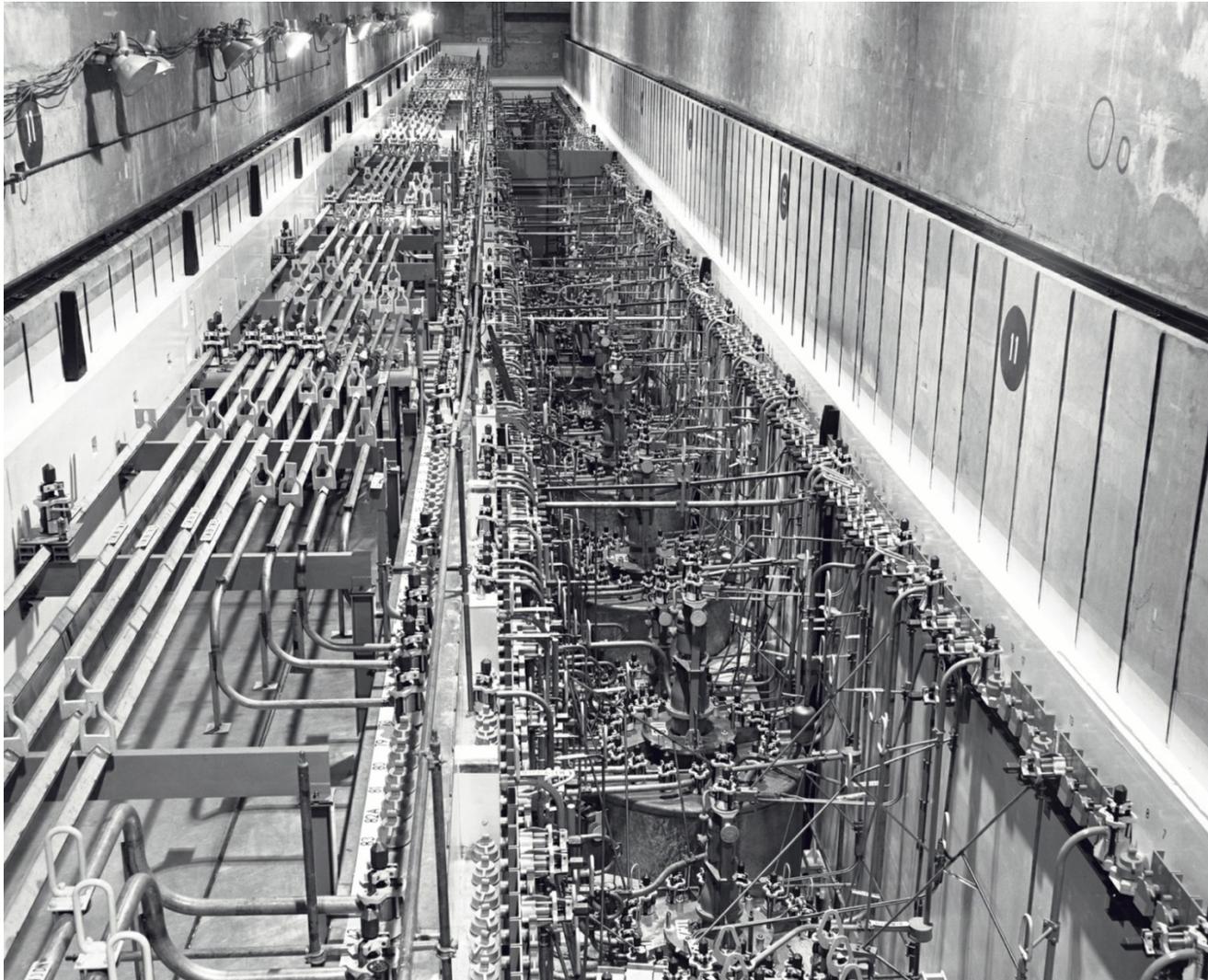


# H Canyon Cross Section



# Warm Canyon with Cell Covers Removed

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# Hot Canyon Crane

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Hot Crane just outside of the crane maintenance area

Crane Control Room



# H Canyon Process Air Exhaust Tunnel – looking west

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# Potential Robotics Applications in H Canyon

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- **Removal of concrete degradation products from canyon cells and sumps and in-cell repair of concrete walls.**
- **Inspection and repair of canyon structures such as the Canyon Air tunnel or exhaust stack.**
- **Size reduction of failed canyon equipment to reduce waste volume.**
- **Transfer of high dose material from shipping drums into fuel tubes.**
- **Inspect and repair piping in difficult to access locations such as confined spaces.**
- **Interior inspection of piping.**
- **Waste drum movements and assay.**
- **Emergency response to chemical and/or radiological solution spills.**

## HB Line

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- **Built in early 1980's and began operating in 1955.**
- **Recovers neptunium and plutonium from solution.**
- **Sits atop H Canyon**
- **Most operations are hands-on Inside glove boxes with little potential for application of robotics.**



# K Area Complex Plutonium Storage

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- Originally built as a production reactor, it was refurbished at the end of the cold war to store excess Pu.
- It also contains one glovebox to examine Pu storage containers to ensure continued safe storage.
- Provides plutonium metal feed to HB Line for conversion to oxide. Plutonium oxide is then shipped back to K Area.



Pu Storage containers

## Potential Robotics Applications in K Area

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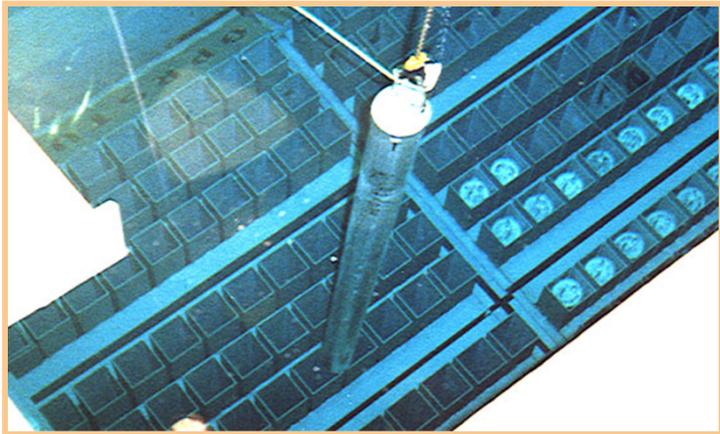
- **Movement and stacking of drums in the material storage area to improve safety and reduce radiation dose to workers.**
- **Semi-autonomous inspection and scanning of building structures and components.**
- **Unpacking high-risk plutonium storage drums.**
- **Movement of drums of heavy water.**

Heavy water drum storage



# L Area Spent Fuel

- Originally built as a production reactor, now only the fuel basin is used to receive and store US origin spent nuclear fuel from both foreign and domestic research reactors.
- Also ships fuel to H Area for dissolution and recovery of uranium.



Fuel bundle being placed in a storage rack  
(all work is done underwater for shielding)

# Potential Robotics Applications in L Area

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- Fuel integrity inspections during storage
- Fuel inspections before opening a transportation package (enter package through vent/drain ports)
- Building inspections similar to K Area including underwater
- Nuclear Material Accountability of dry fuel storage area
- Underwater Cask lid bolt removal
- Inspection of Basin water filtration system
- Emergency response radiological events.

Cask decontamination  
and surveying



## Summary

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- Many applications of robotics in H, K and L Areas
  - Remove personnel from hazardous environments
  - Perform repetitive tasks to reduce human error
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- Questions?