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The Biggest Environmental Risk You Missed

REMTECH
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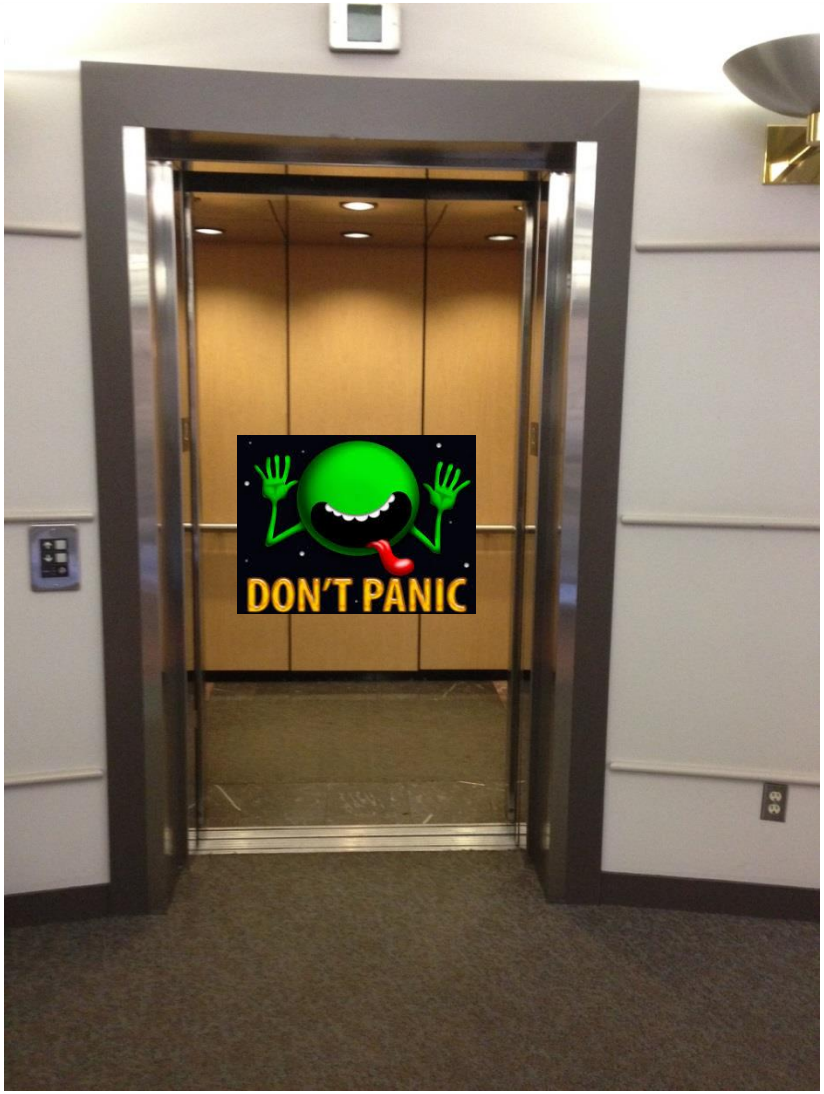
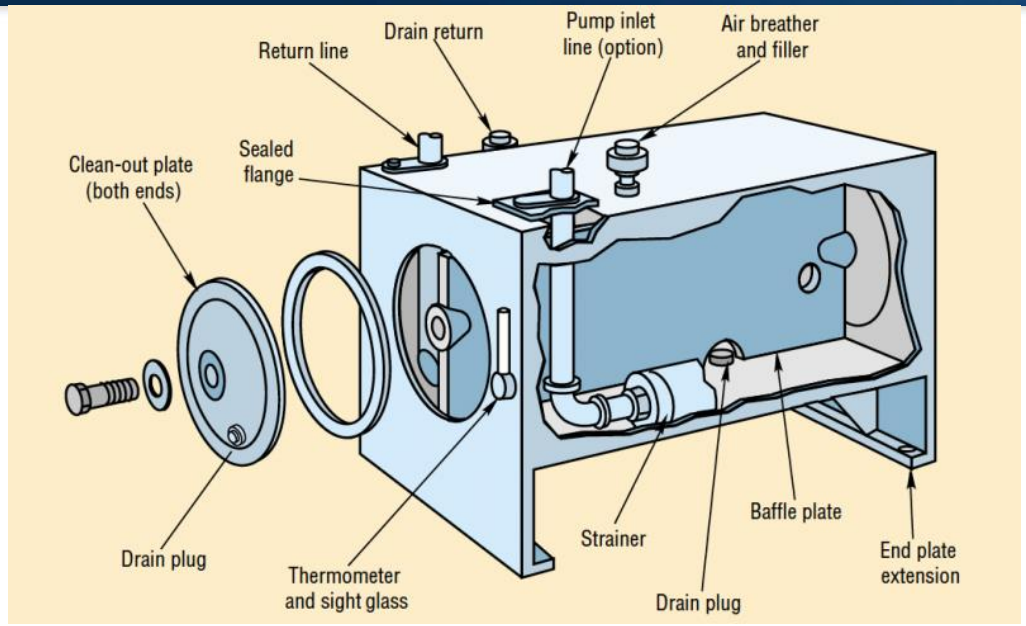
DANGER


DON'T PANIC

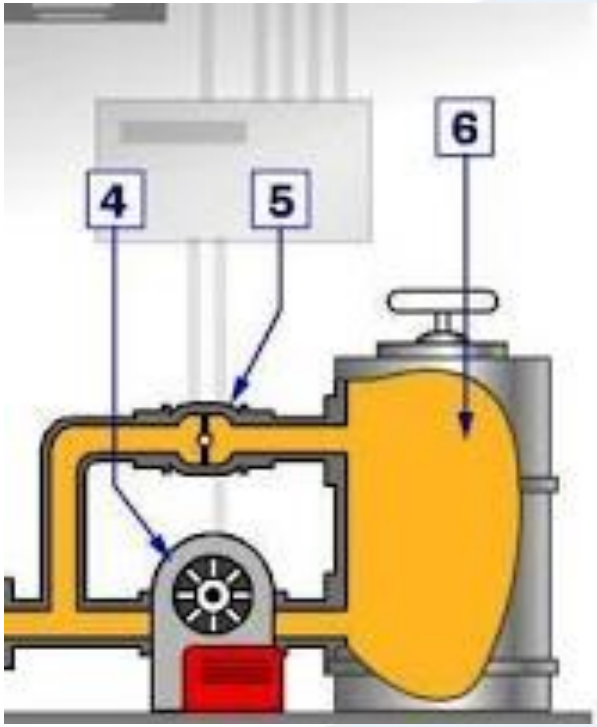
What we normally look at

Sometimes we see this

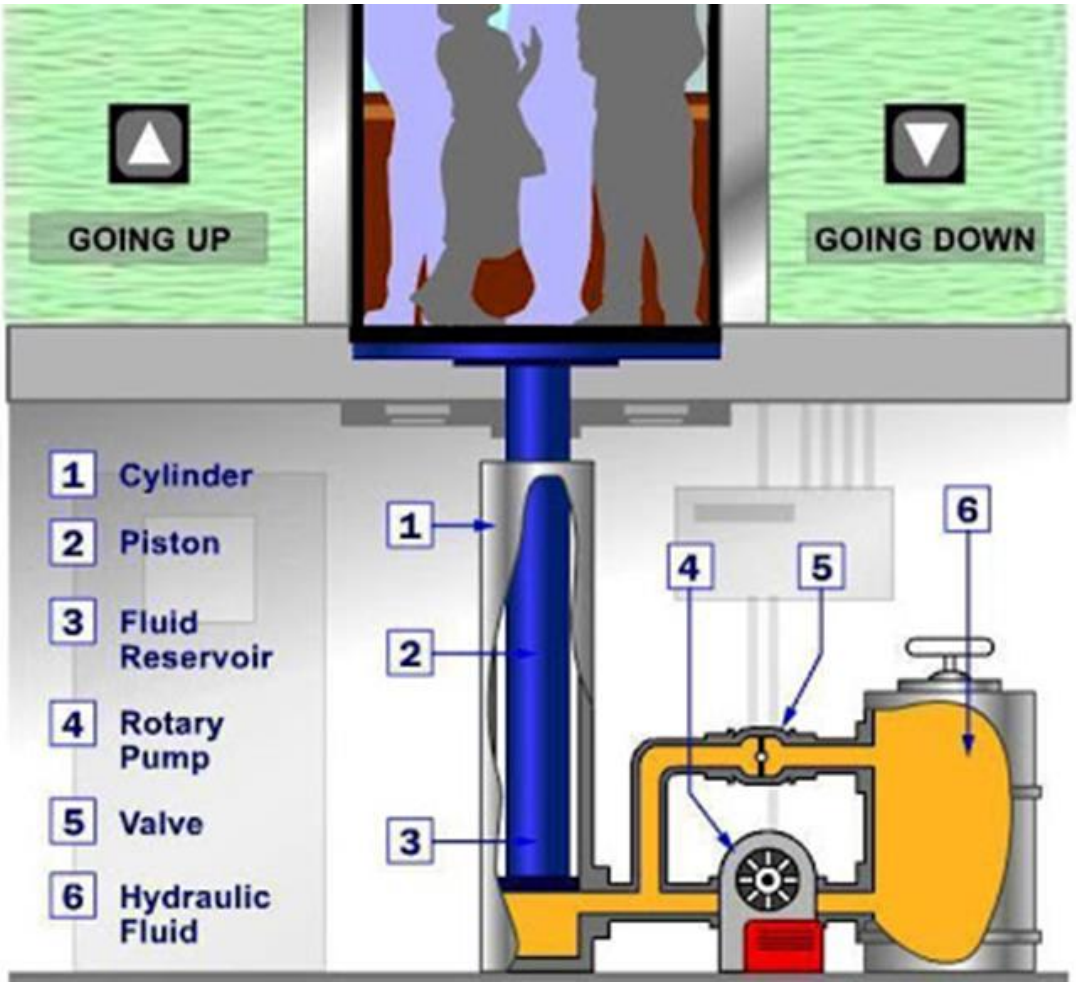
Or this



4 Rotary Pump
5 Valve
6 Hydraulic Fluid

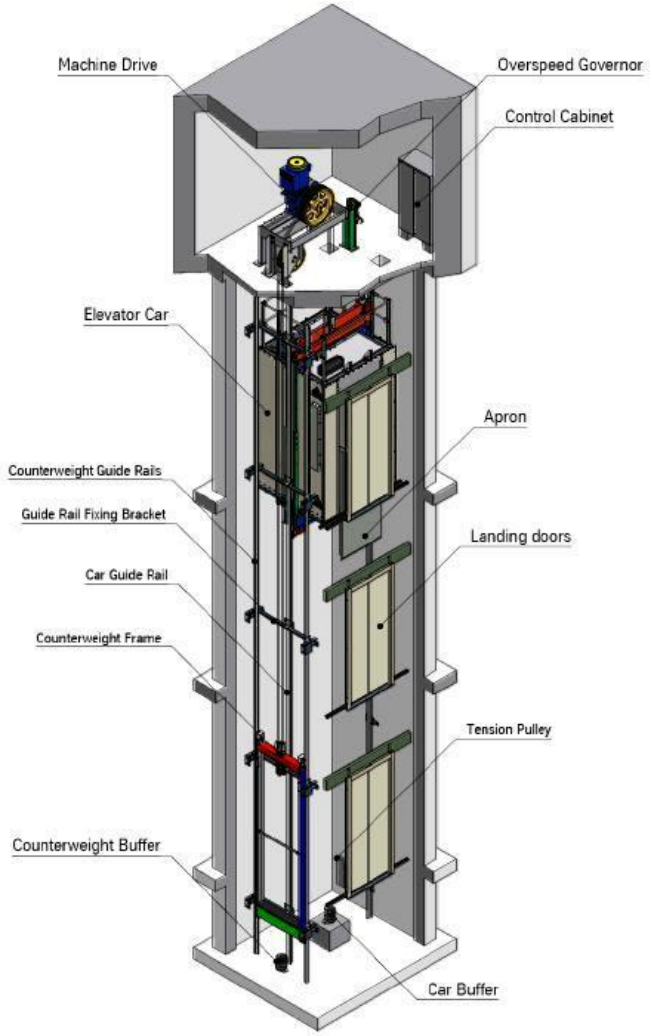


Basic Pricinpals



Types of Elevators

- Traction (or cable) Elevators

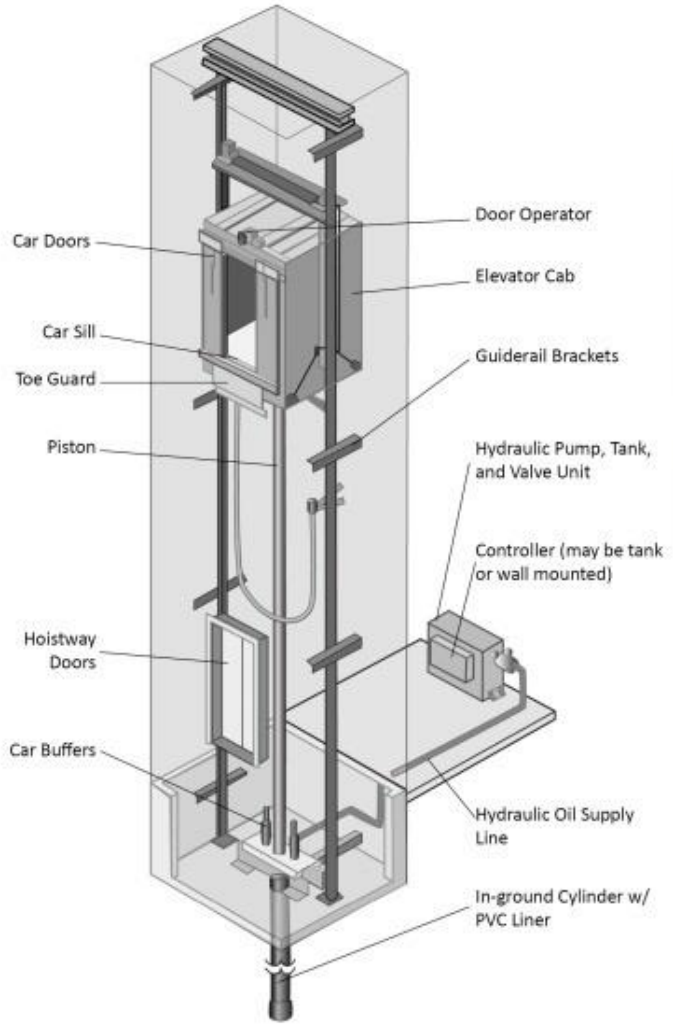


- Hydraulic Elevators
  - Separated into 3 major categories.

  Each with a different risk profile

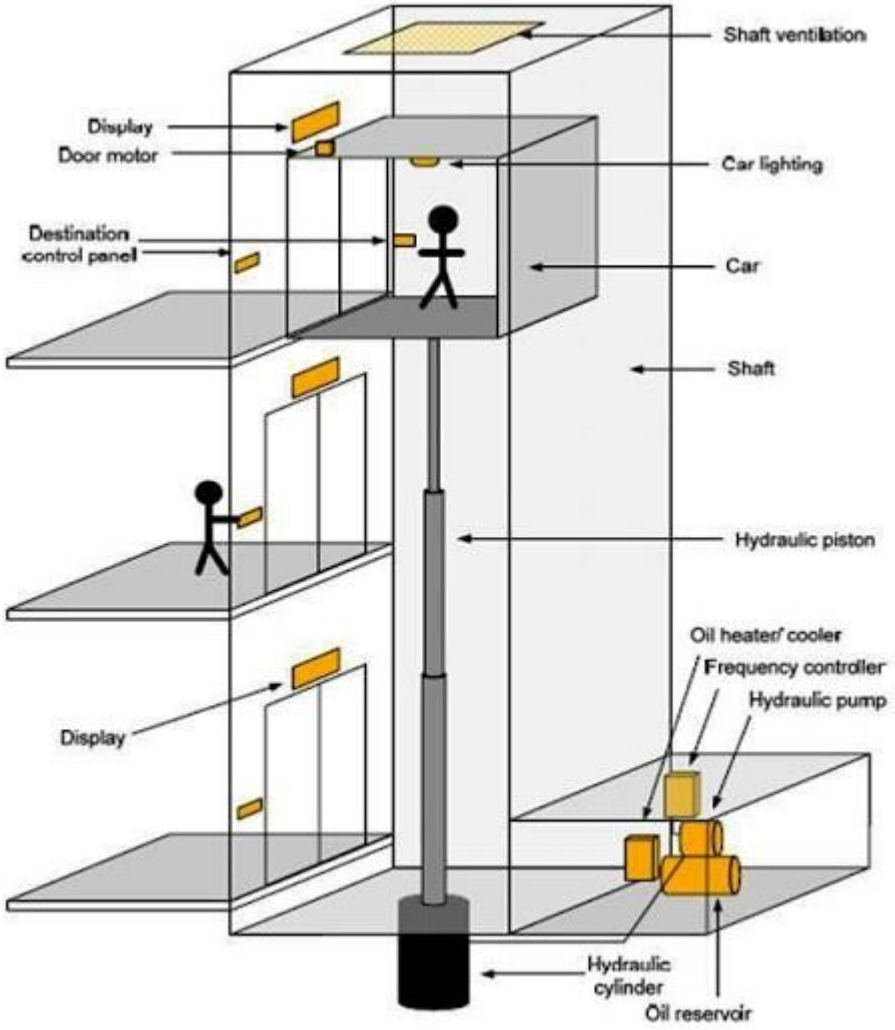
Conventional Holed Hydraulic Elevator

- These are based on the original hydraulic elevator design.
- Has one piston nearly the height of the building
- Leaks can occur at depths of 60+ feet



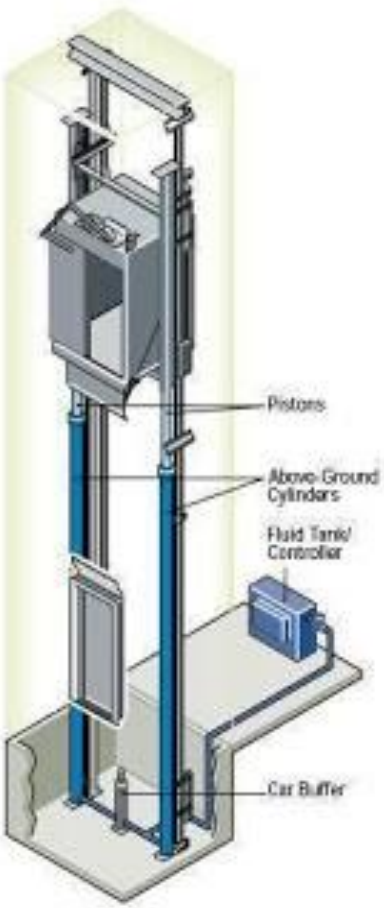
Conventional Holed Telescoping Hydraulic Elevator

- Similar to above, but telescoping allows for less piston length when contracted.
- Leaks are still at depth, but shallower.

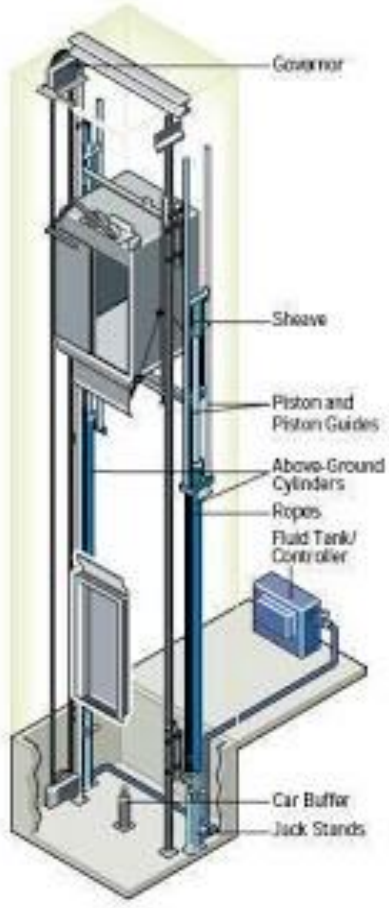


Non-Holed Hydraulic Elevator

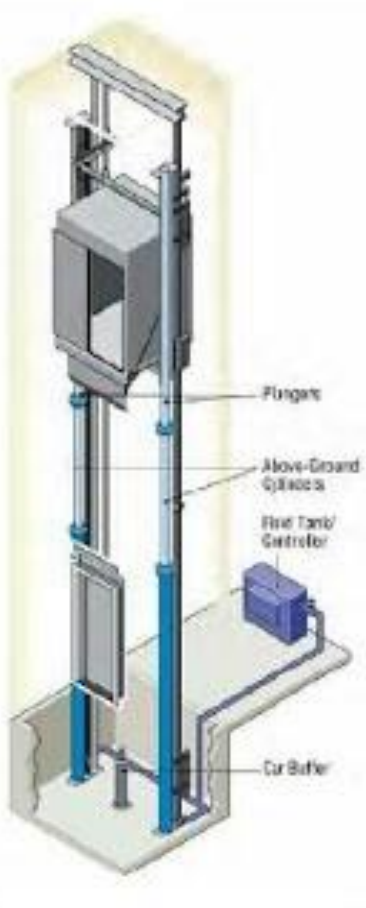
- Usually has two pistons (one on each side).
- Has no below ground features.
- Less environmental risk.
- Cannot usually go as deep.



Non-telescoping (single stage) Hydraulic Elevators



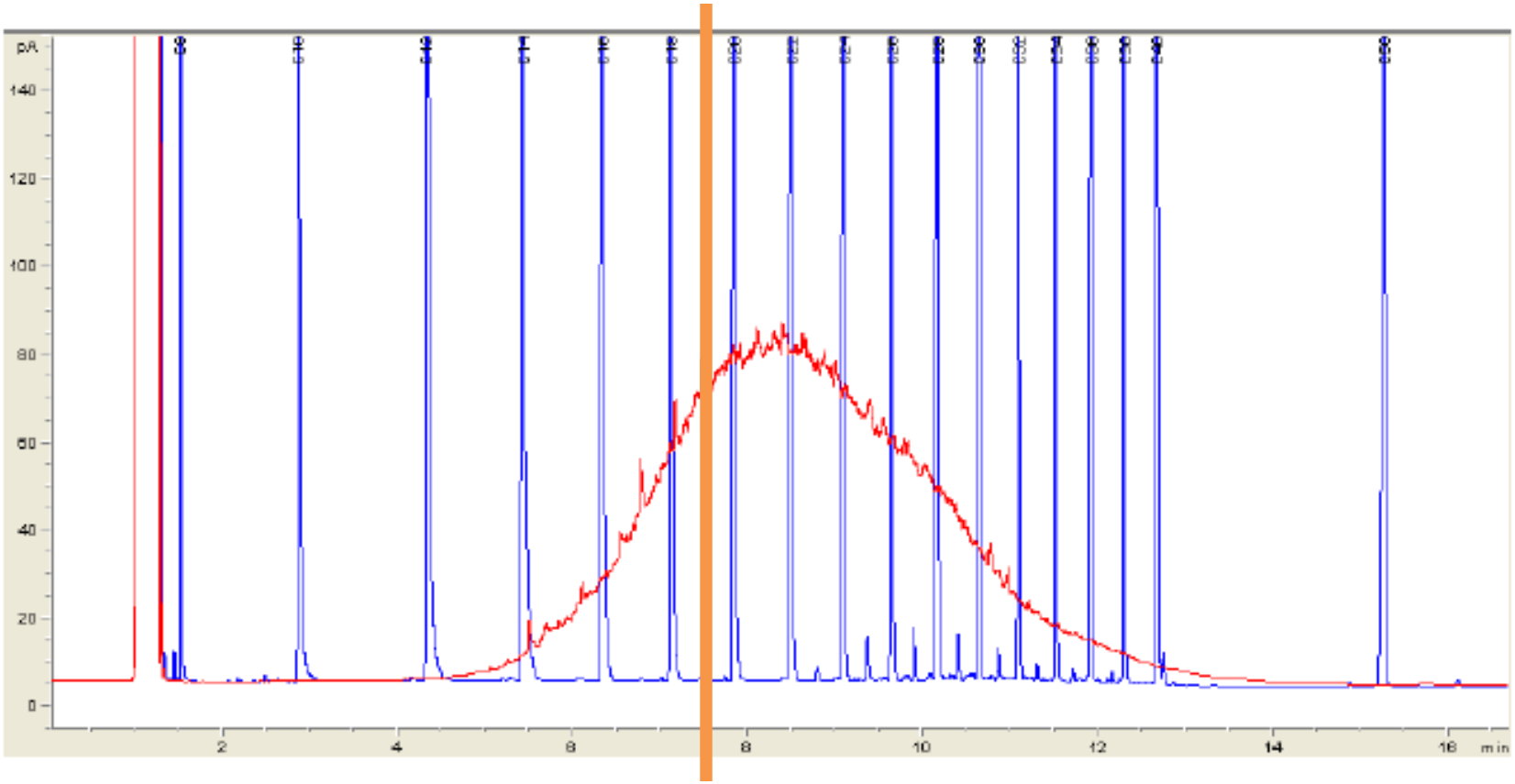
Roped Hydraulic Elevators

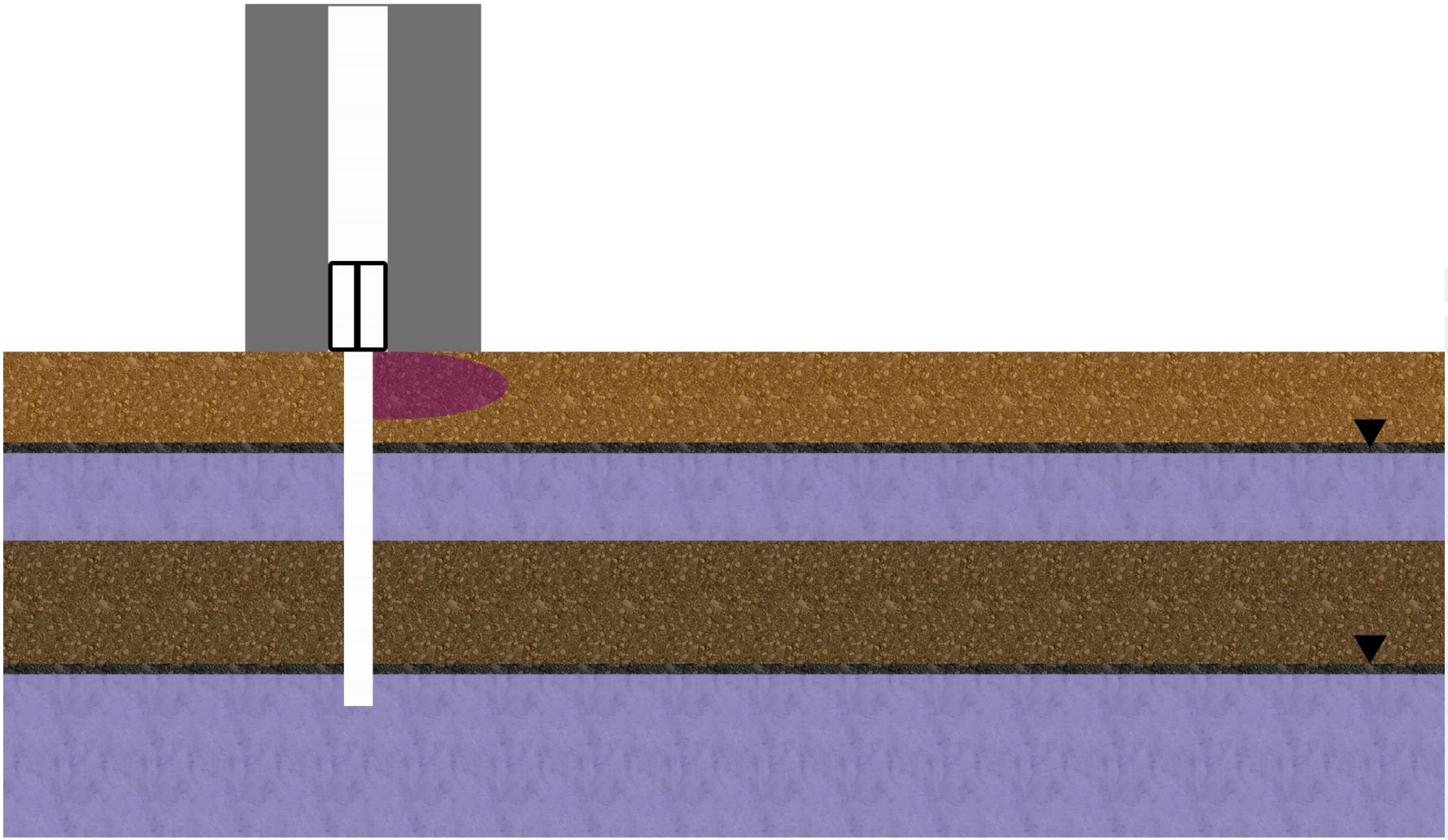


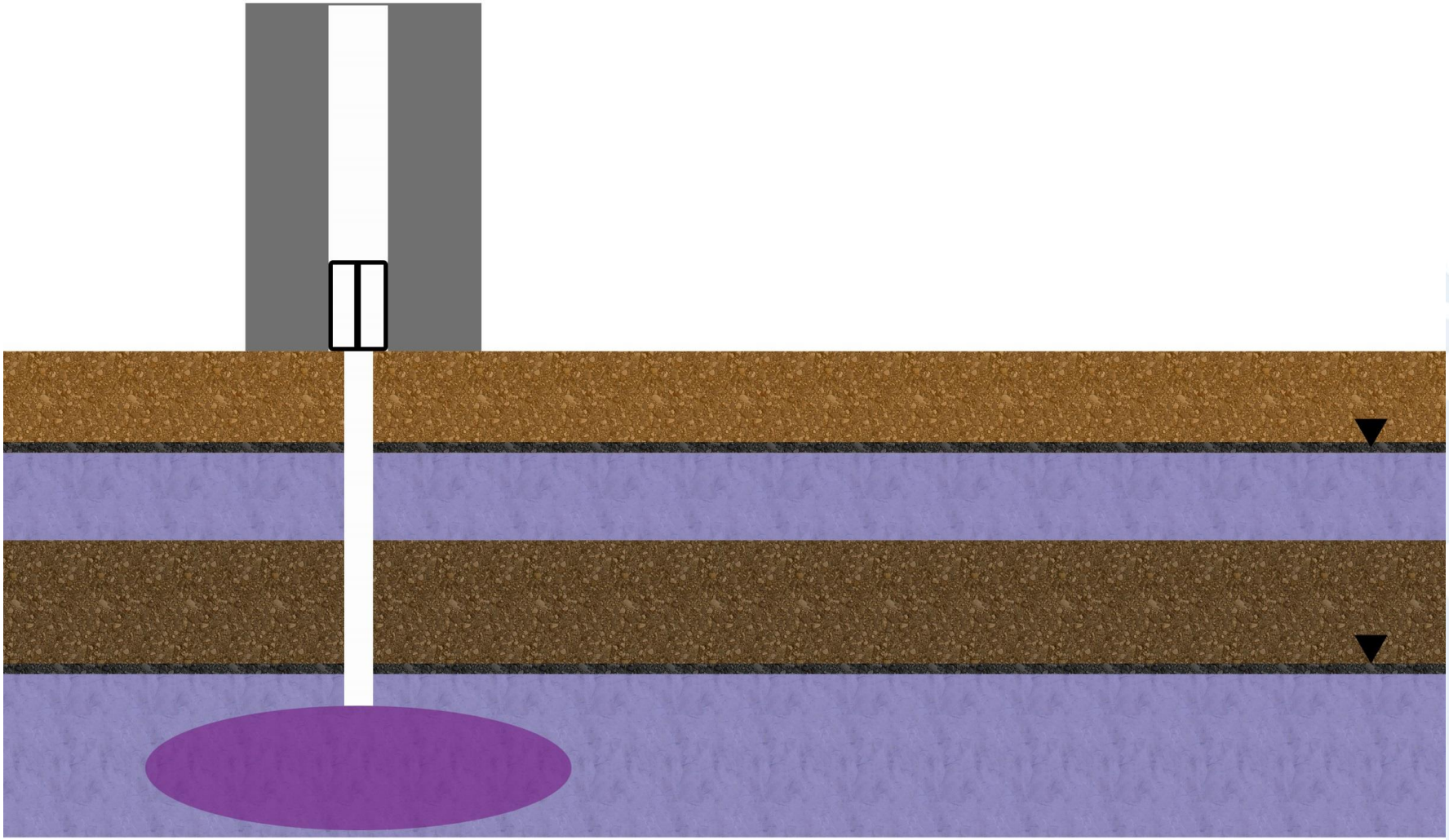
Telescopic Hydraulic Elevators

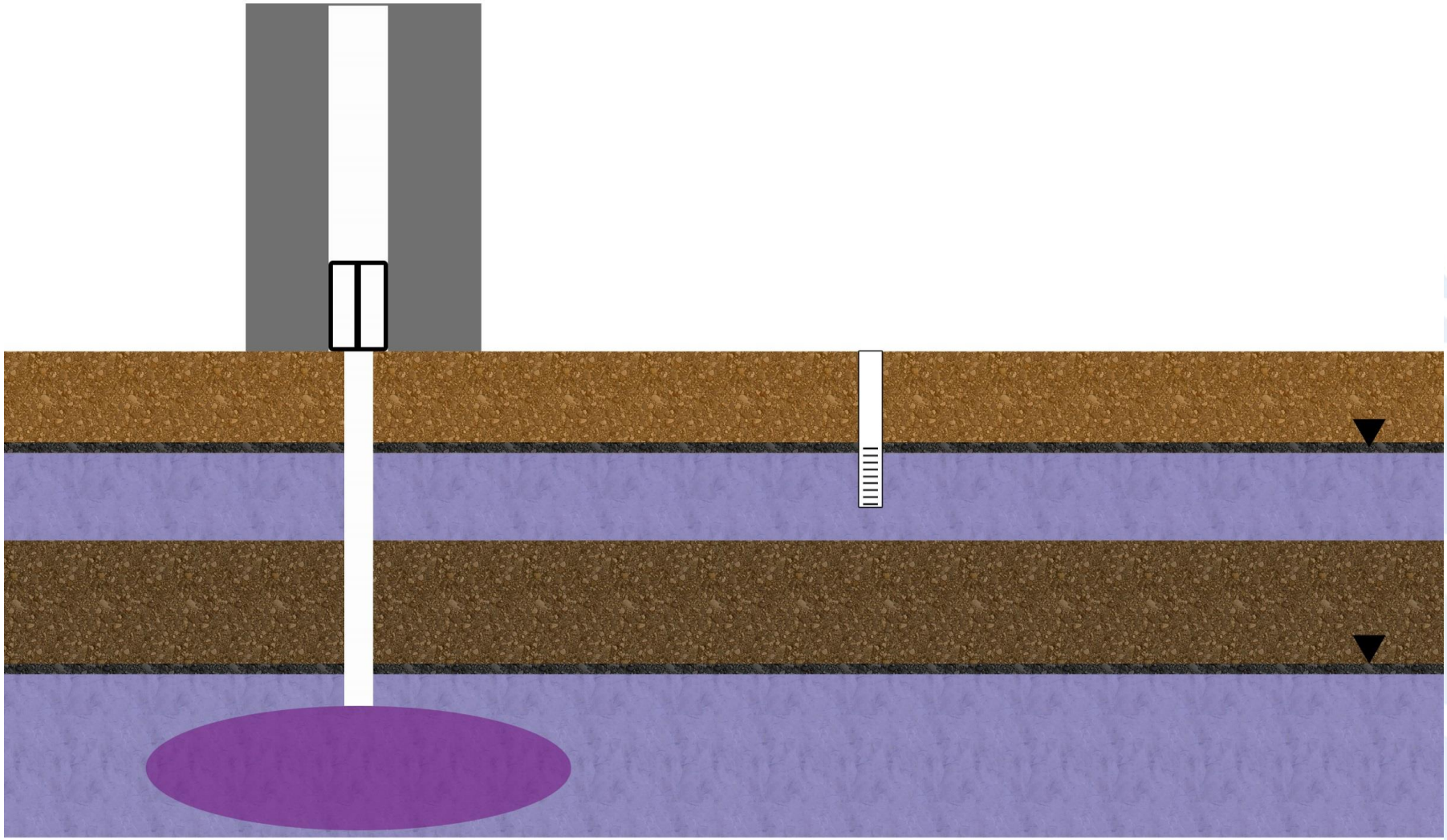
What leaks?

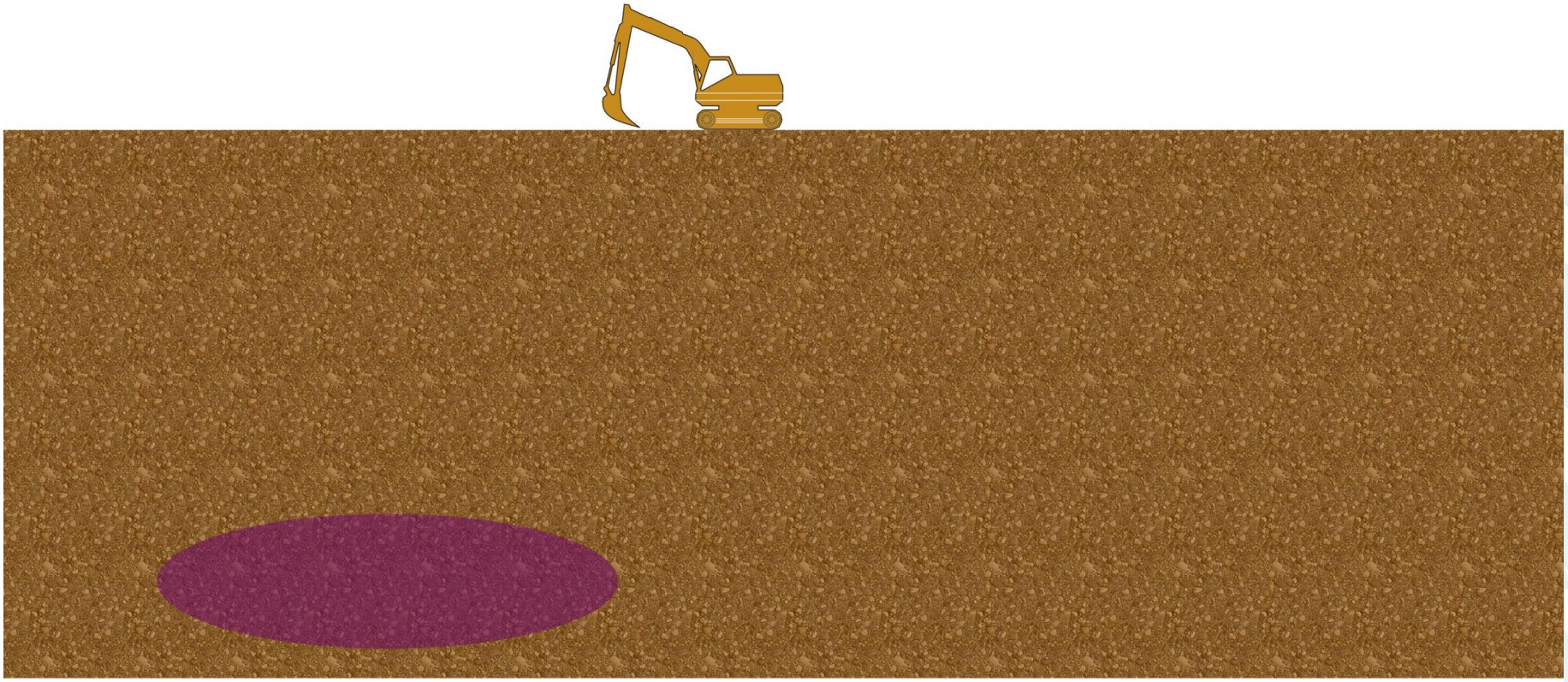
Hydraulic Oil

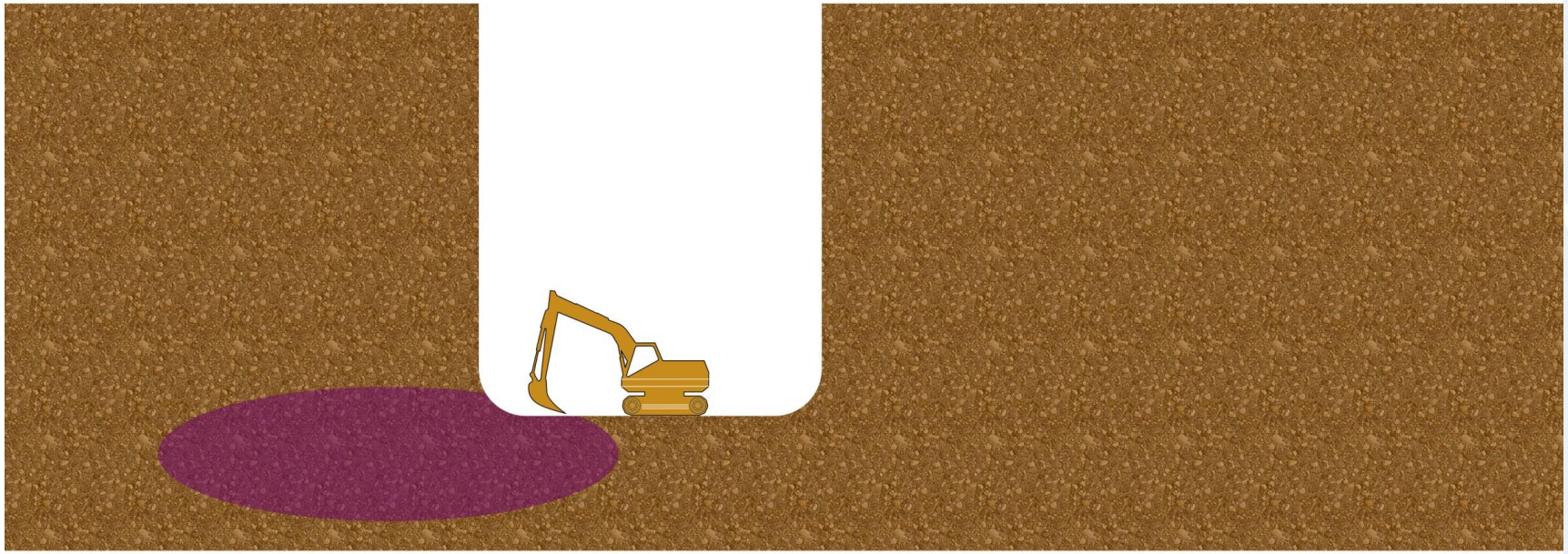




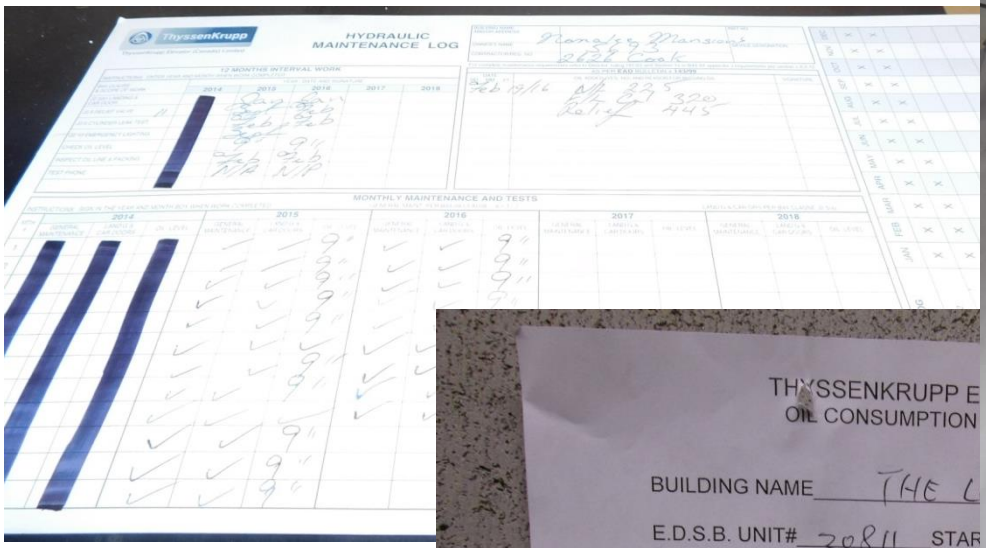


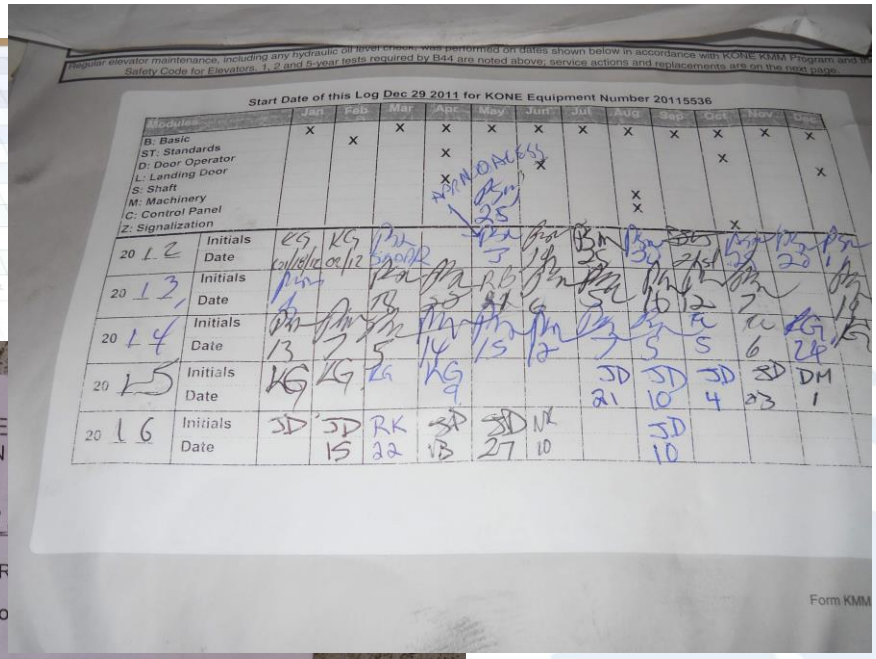


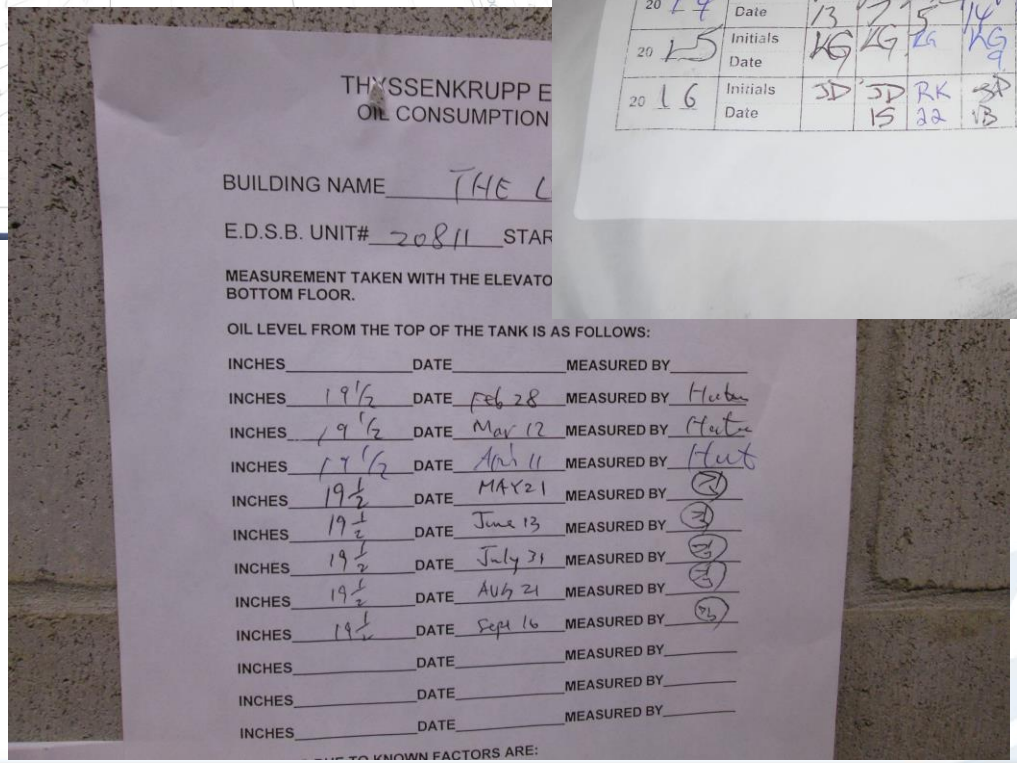




How do we assess the potential?





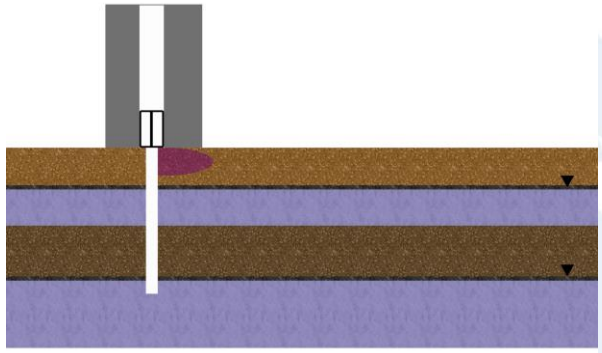


Scenario 1

- Loss of hydraulic fuel from reservoir due to a sewer backup and flood in the basement.
- Hydraulic fluid carried by sewer water to drainage tiles.
- Soils analyzed for hydrocarbons and PCBs.
- Subsurface impacts were found to be shallow based on the nature of the release.
- Several excavation rounds were conducted, with hand excavation used in areas closest to the Site Building.
- Verification samples demonstrated remedial goals were met.

Scenario 2

- Underground hydraulic oil supply lines were leaking.
- Impacts were located in the groundwater at a very shallow depth below the parking level. Thus limiting the depth and extent of impacts.
- Free-phase liquid and groundwater was recovered through a pump and treat system.
- Boreholes drilling in parking level found little impacts following recovery activities.
- Risk-assessment used to address residuals.



Scenario 3

- Excavation work was being conducted on a Mall property in order to expand an old Zellers location for a new tenant.
- A Phase I had been conducted (by others) and recommended no further investigation.
- Excavation works had extended below the water table, and groundwater was being filtered and then discharged to the storm sewer system.
- Excavator encountered odorous soils and all work stopped until an assessment could be completed.
- Impacts identified as hydraulic oil from an elevator that serviced the second floor of the Zellers.
- Groundwater treatment and permits were obtained to allow resumption of dewatering and discharge to sewer system.
- Impacted soils segregated and disposed of appropriately.
- Luckily client was able to mitigate lost time by switching areas being worked on.

Scenario 4

- Hydraulic oil is documented to have leaked from an elevator system.
- Insufficient access is available to allow for a drill rig with sufficient power to get near the elevator system.
- No access to the elevator system was granted when the elevator was repaired (we were informed after the fact).
- If sumps are present, check them for evidence of hydraulic oil impacts.
- Conducted assessments downgradient of the elevator system, outside the building footprint.
- As expected, no impacts were observed. Recommended further investigation if/when the building gets taken down.

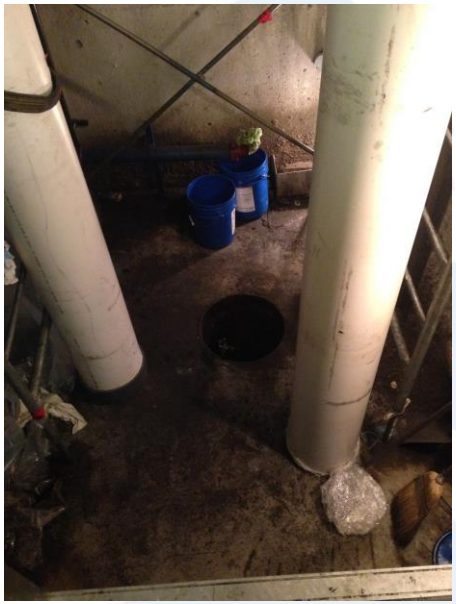
Scenario 5

- Hydraulic elevator leak investigation and remediation conducted at time of elevator repair.
- Piston removed from cylinder.

- Cylinder vacuumed out to remove oil over water.
- Cylinder removed (>70 feet deep).

Scenario 5 (cont.)

- Casing (caisson), which had no seal on bottom, vacuumed out to remove water and oil, including groundwater recharging into casing. When water appeared clean, samples collected and vacuuming stopped. Remaining impacts were risk managed in-place.



- PVC sleeve, with bottom capped placed inside casing to reduce potential for future loss.
- New cylinder installed and elevator systems re-instated.

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