



Well Plugging Operations and Challenges

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12/3/2021



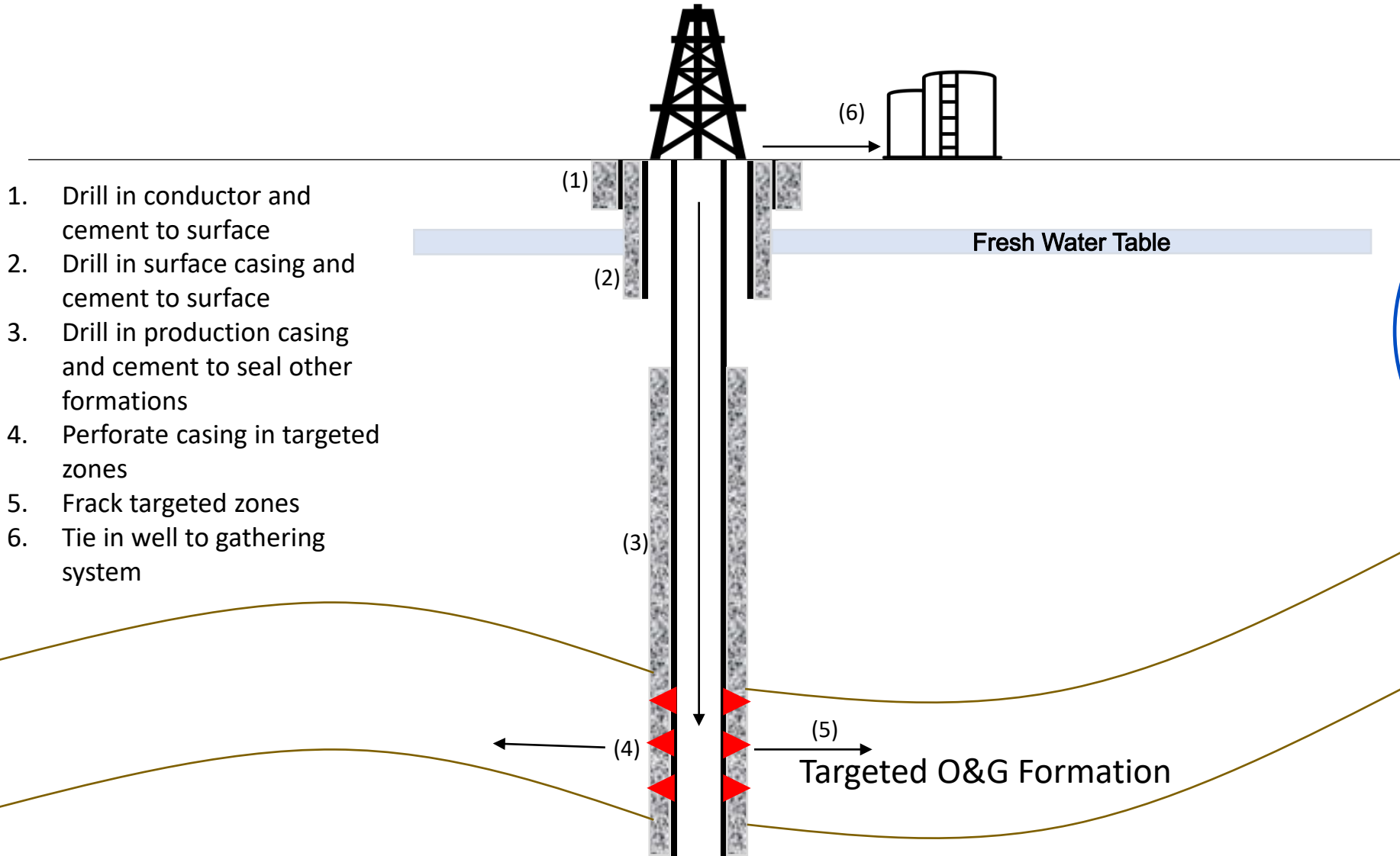
Overview

- **Oil and Gas Well Construction Through History**
- **Typical P&A Procedures on “modern” versus “legacy” wells**
- **P&A Challenges with legacy wells**

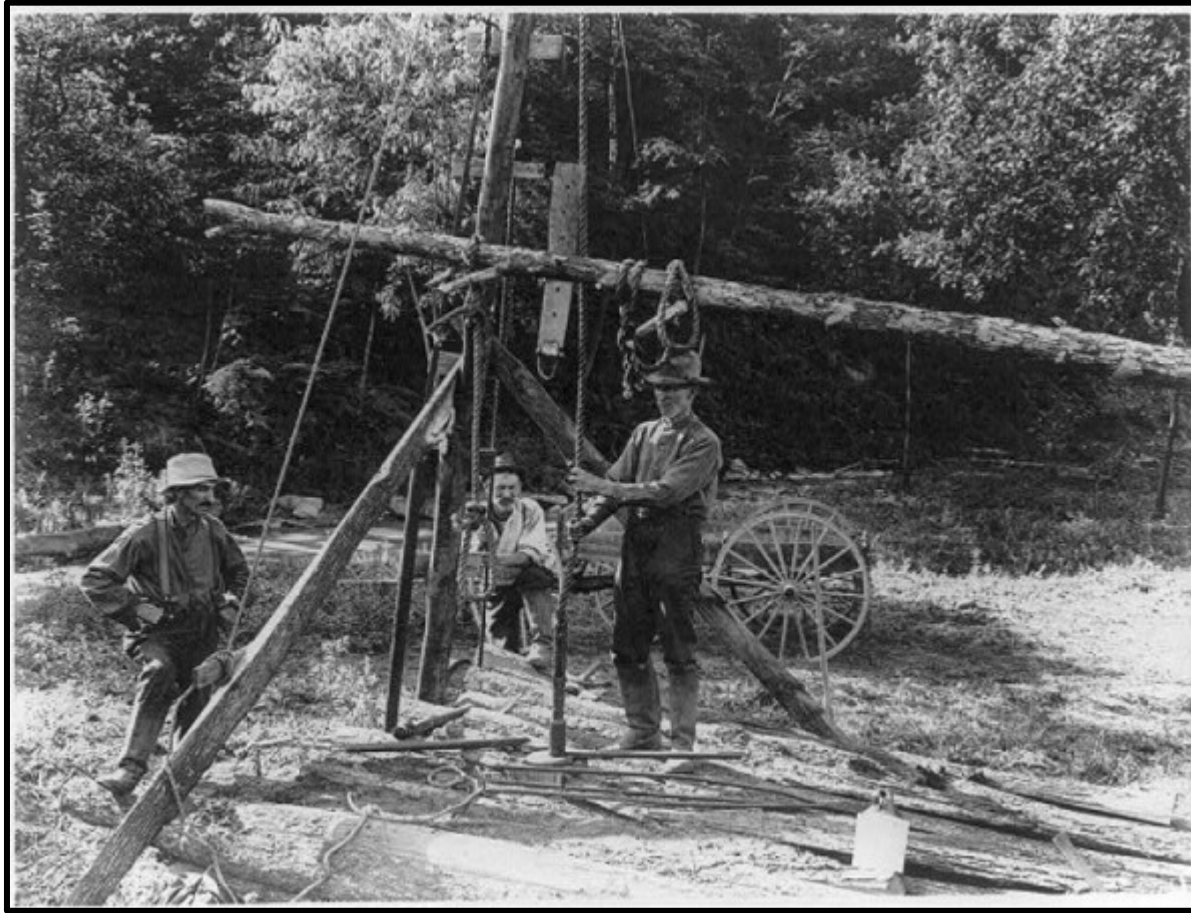
How An O&G Well is Drilled



How A Modern O&G Well is Drilled

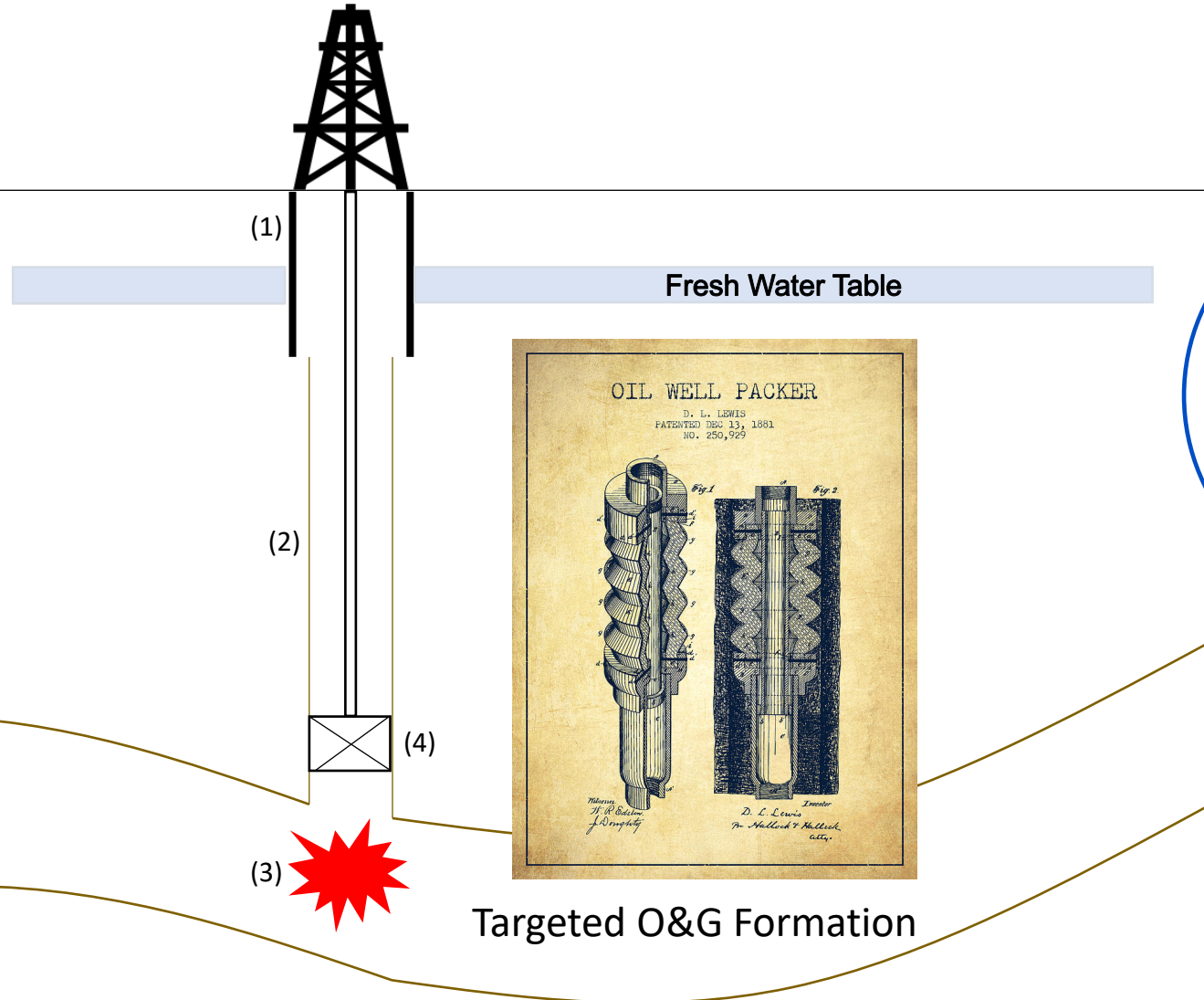


How an O&G Well Used to be Drilled

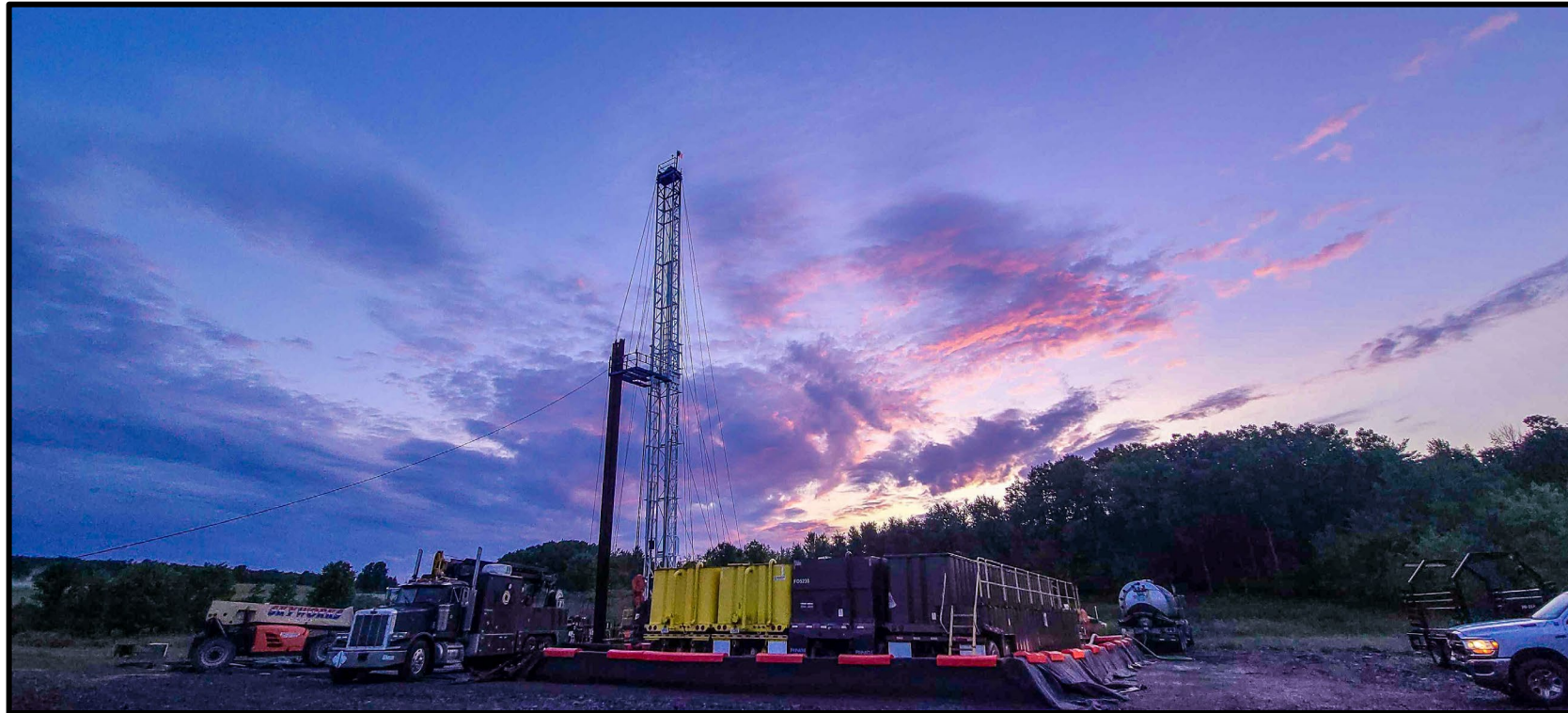


How an O&G Well Used to be Drilled

1. Drill hole for surface casing; sometimes left uncemented
2. Drill remainder of the well with cable tools
3. Shoot the targeted formation using nitroglycerin
4. Run a packer with tubing to bring hydrocarbons to surface

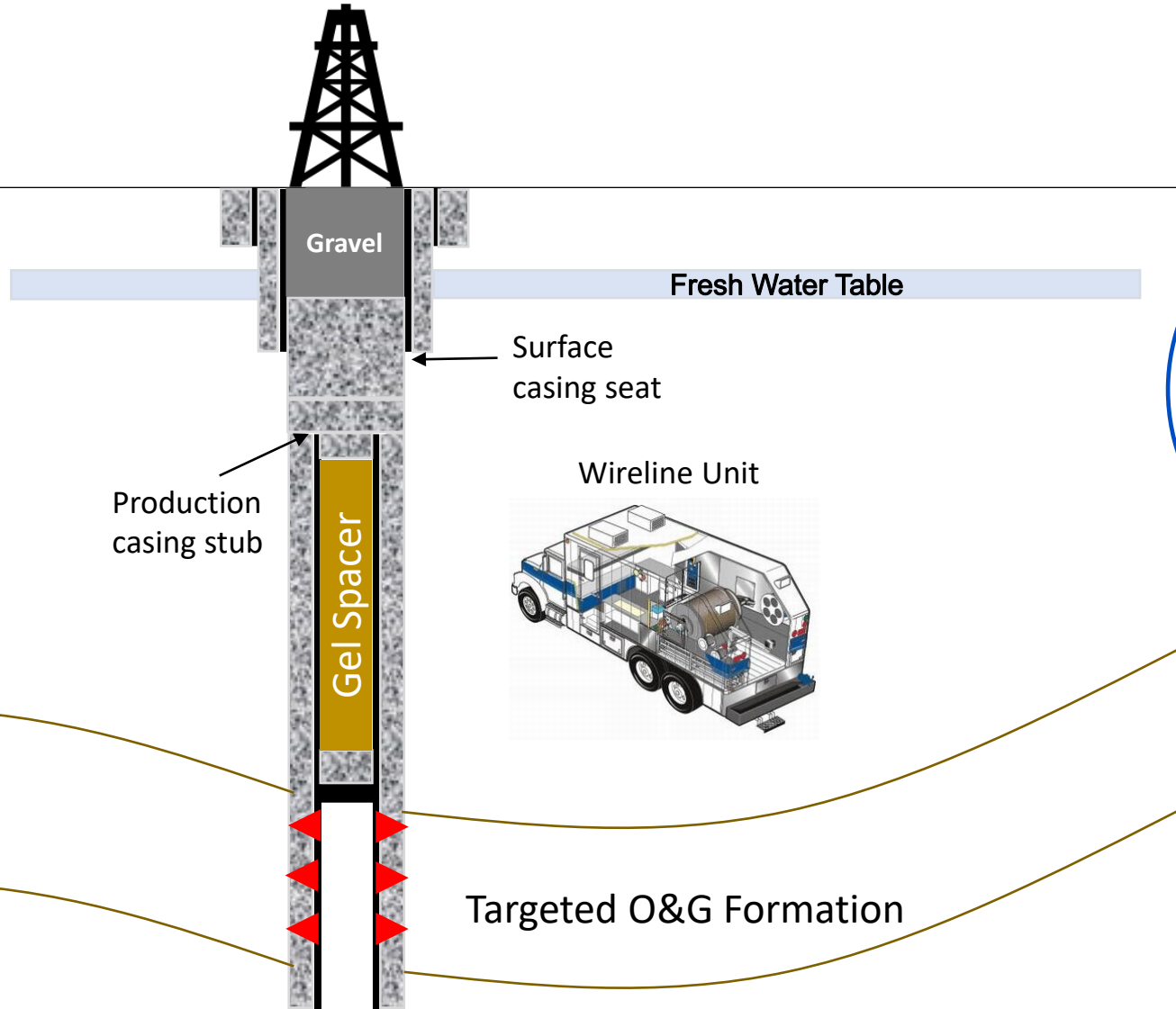


How A Modern O&G Well is Plugged



How A Modern O&G Well is Plugged

1. Pull any production tubing
2. Set a cast iron bridge plug above the top of the perforations using wireline
3. Pump cement plug on top of bridge plug
4. Run cement bond log on well to determine the top of cement; cut casing at free point
5. Pull casing
6. Cement across casing "stubs" and "seats"

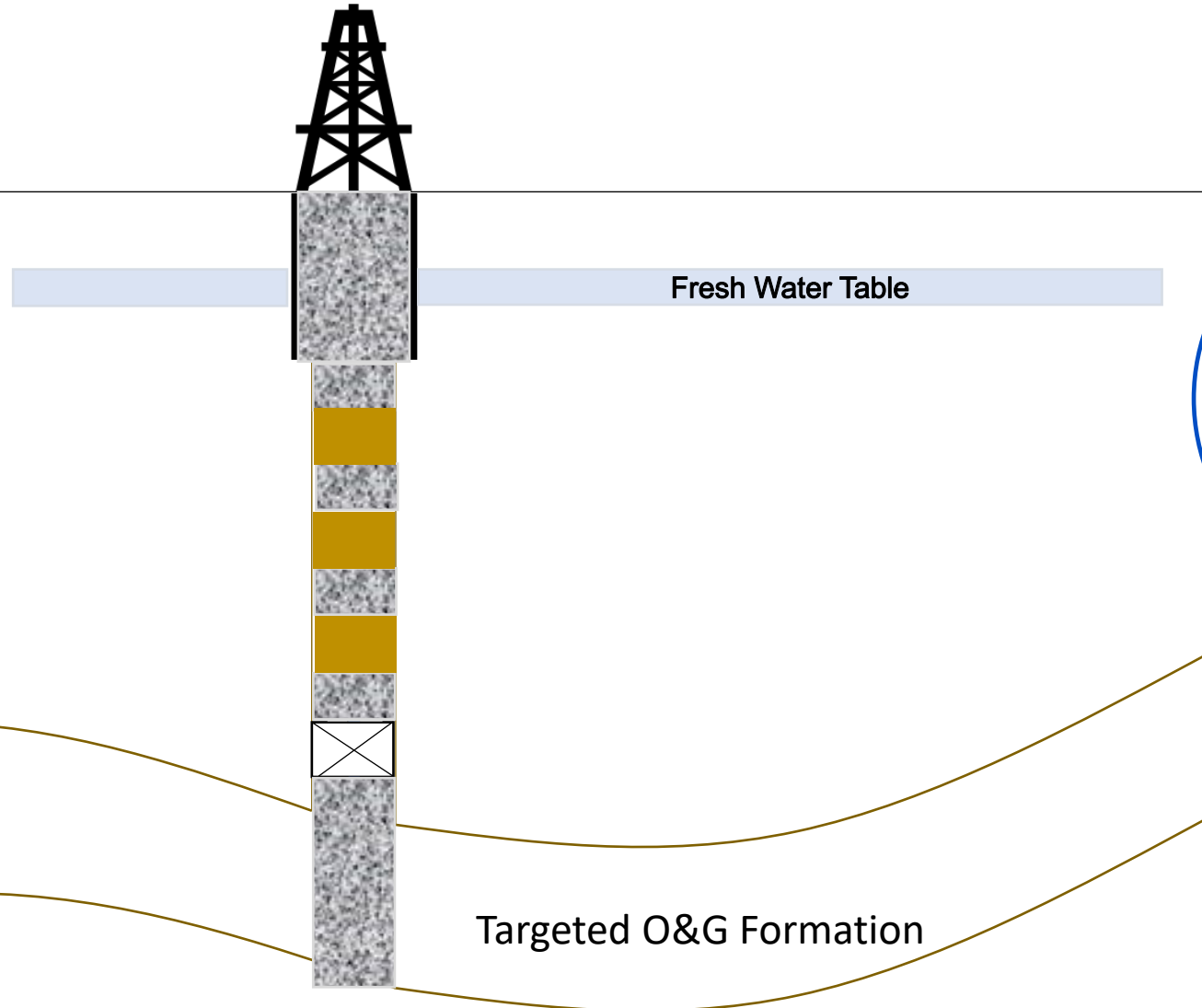


How a “Legacy” O&G Well is Plugged



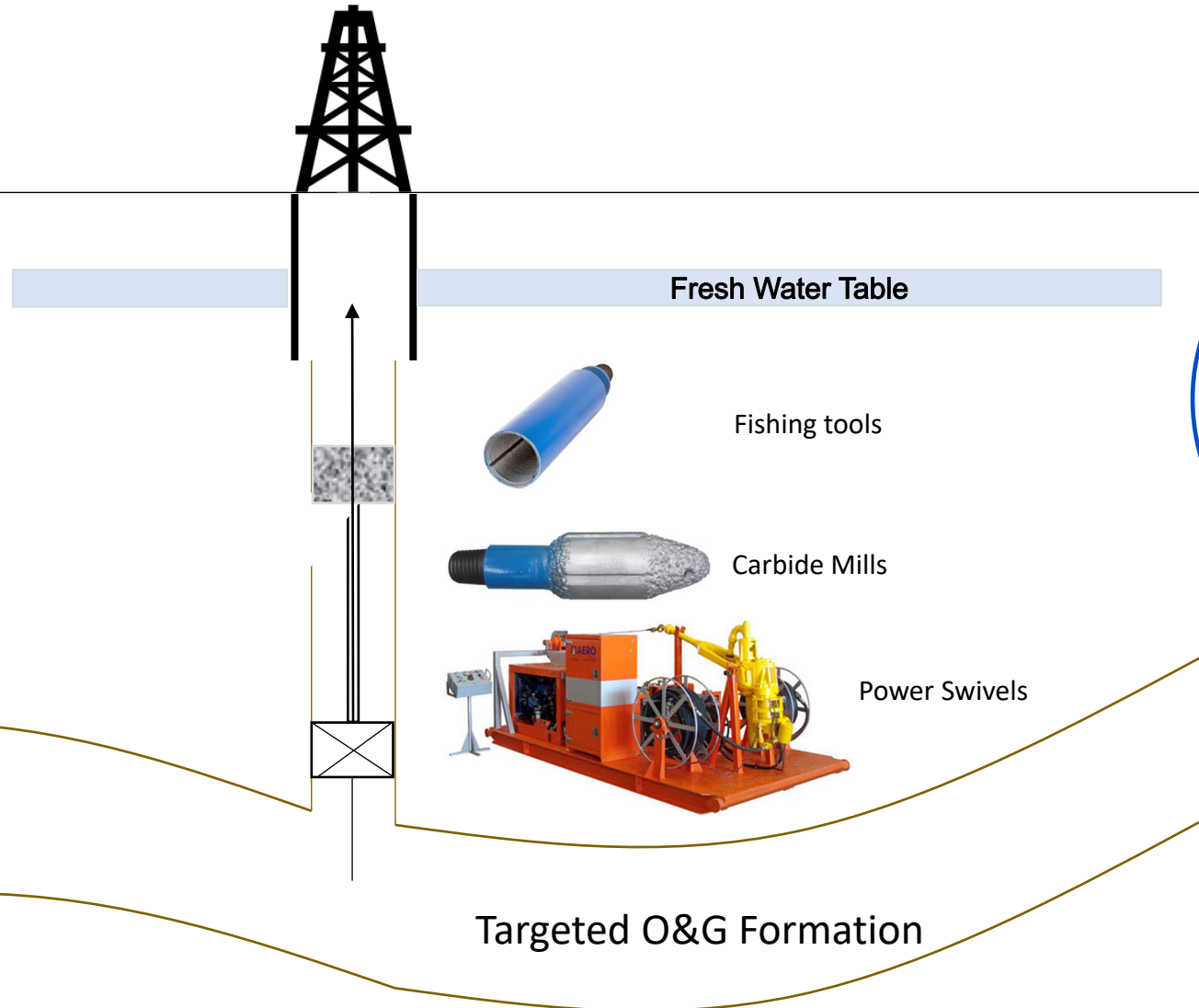
How a “Legacy” O&G Well is Plugged

1. Run in below the packer with smaller tubing and cement
2. Cut tubing with wireline or mechanically above the packer and remove
3. Cement on top of packer and across hydrocarbon producing formations
4. Cement across casing seat



How Things Usually Go Wrong

1. Attempt to pull the packer before shutting off gas from the bottom formation
2. The tubing pulls apart
3. Attempt to fish and continue to pull tubing apart in small pieces
4. Attempt to mill up the tubing and begin drilling a new hole
5. Attempt to cement at current depth and the plug is "gas cut"





Questions / Comments