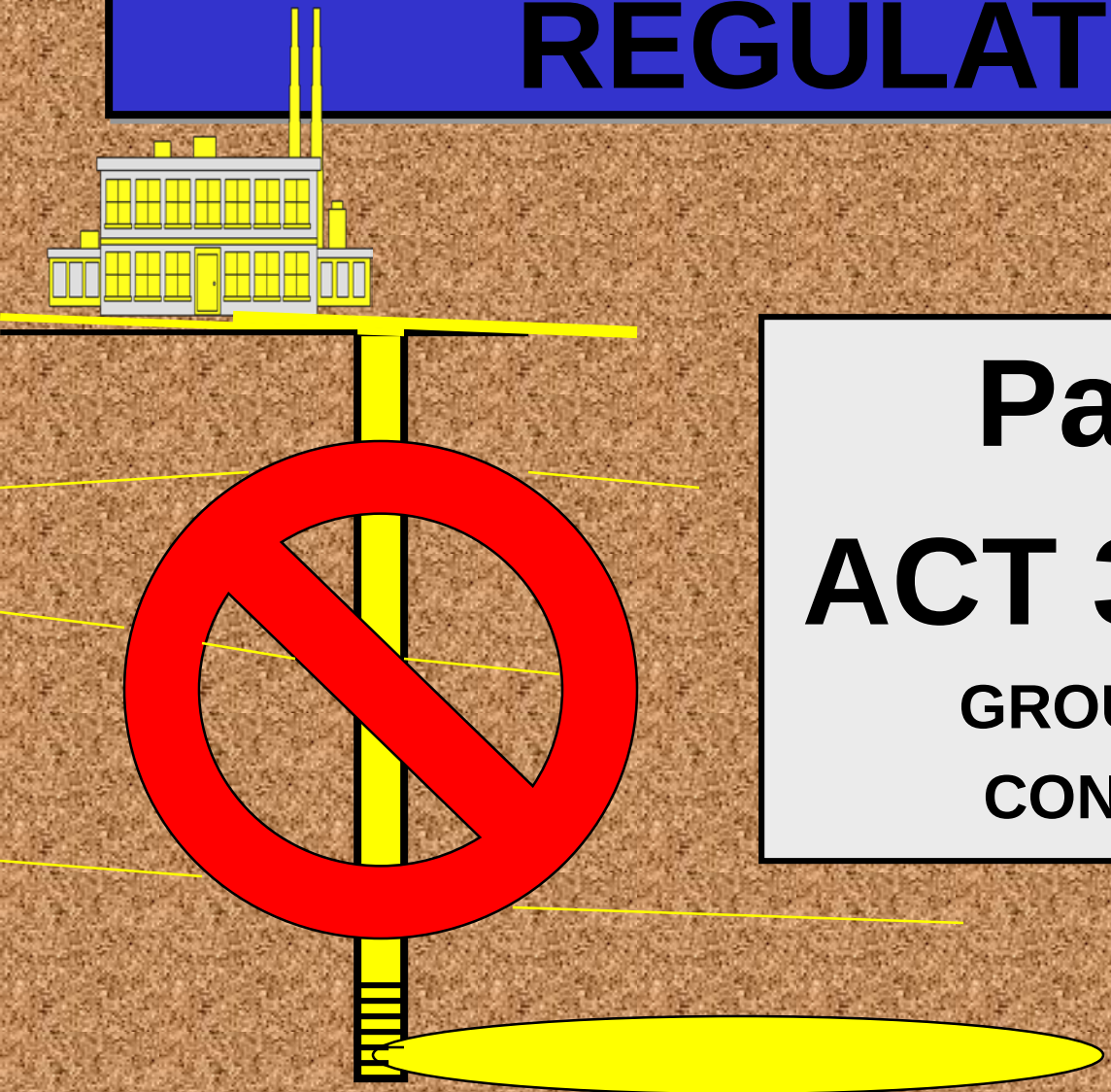
Plugging Bedrock Wells

WELL ABANDONMENT REGULATIONS



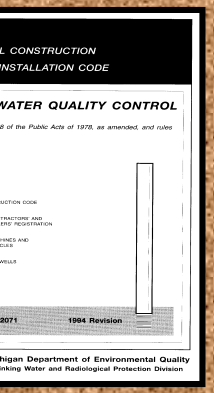
Part 127

ACT 368 PA 1978

GROUNDWATER QUALITY CONTROL RULES

RULES

R 325.1663 Rule 163. (1) (b)



ROCK WELLS

- BEDROCK PORTION + 20'ABOVE MUST BE PLUGGED WITH NEAT CEMENT OR CONCRETE GROUT

RULES

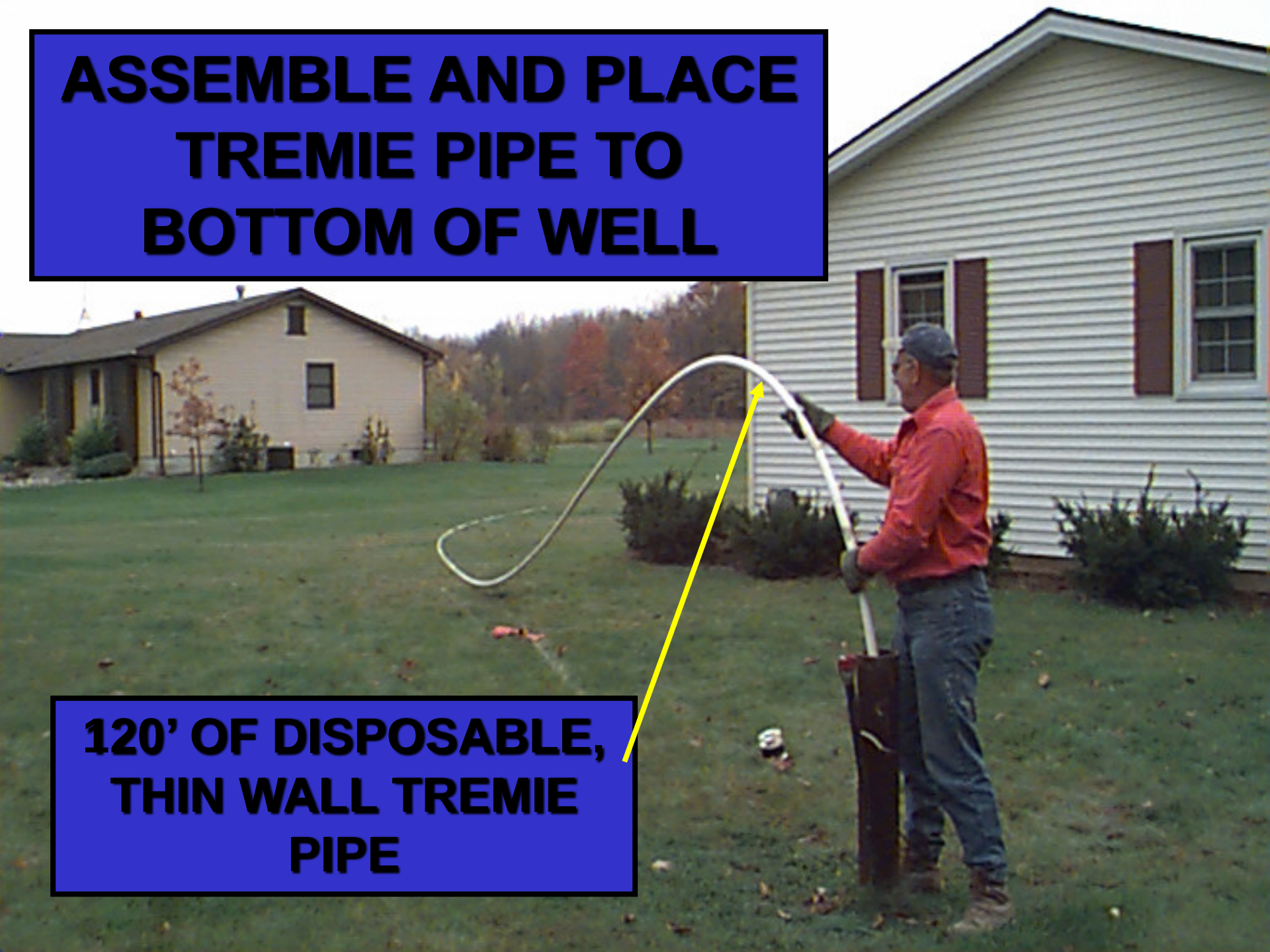
R 325.1664 Rule 164. (a-c)

NEAT CEMENT, CONCRETE, OR BENTONITE GROUT SLURRIES

* A tremie pipe from the bottom of the well to the ground surface must be used. All obstructions must be removed prior to placement of the tremie pipe.

MEASURE WELL DEPTH TO ESTIMATE THE VOLUME OF PLUGGING MATERIAL NEEDED.

ASSEMBLE AND PLACE TREMIE PIPE TO BOTTOM OF WELL



120’ OF DISPOSABLE, THIN WALL TREMIE PIPE

Using Tremie Pipe Without Solvent-welding Joints

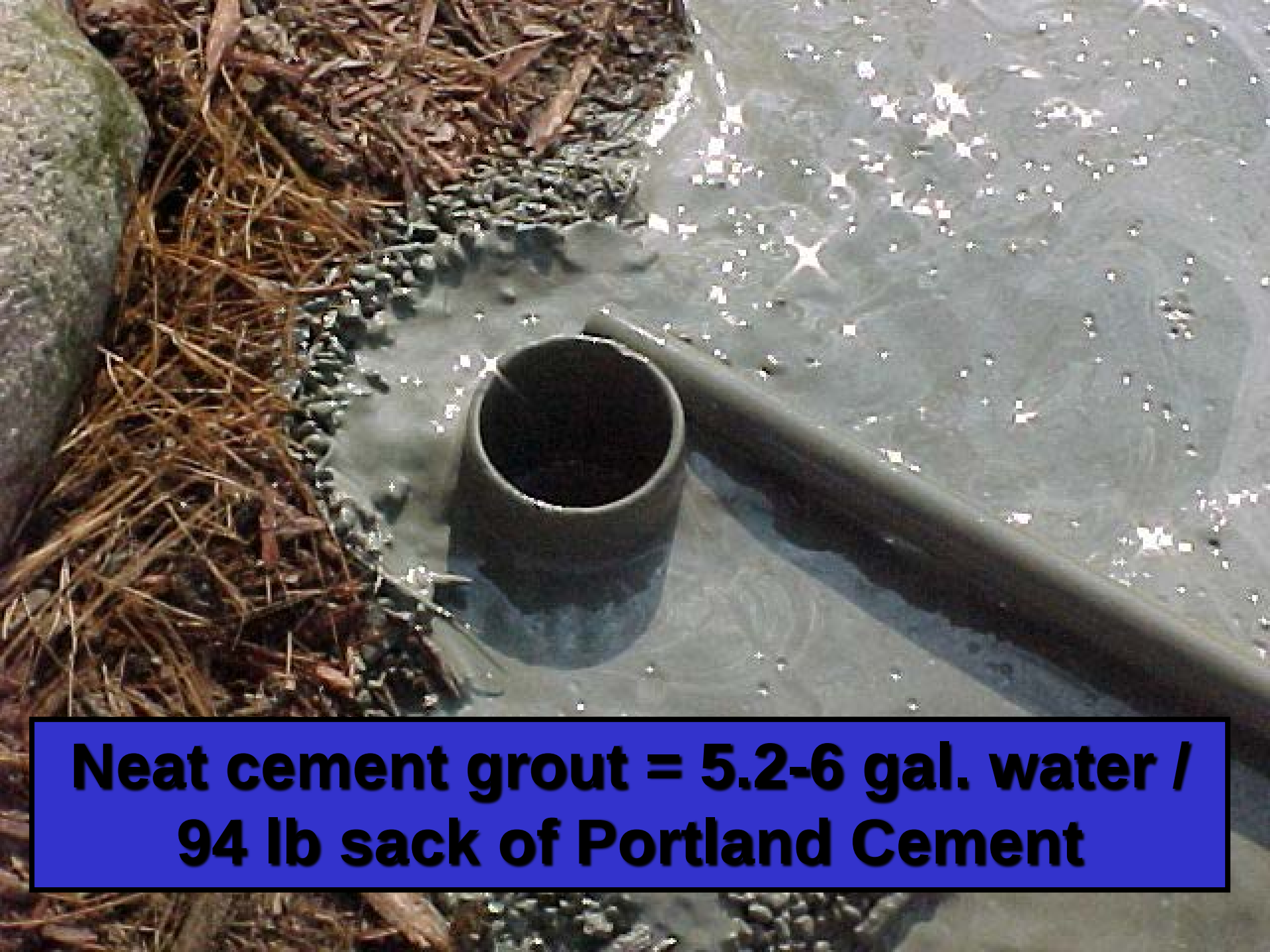
CEMENTING RIG

Temporary casing extension put on a well casing that terminated in the bottom of a well pit. Removed after plugging material has been placed.

Pump neat cement using a tremie pipe to the bottom of the well.

Cloudy water will appear before the cement returns to the surface.

Add 15-20% to allow for routine loss to formation.



Neat cement grout = 5.2-6 gal. water / 94 lb sack of Portland Cement

WEIGHING NEAT CEMENT GROUT USING MUD SCALE.

15 LB/GAL. (6 GAL./94 LB SACK)

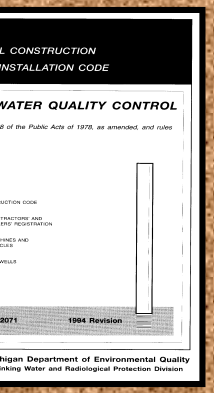
UNIQUE SITUATIONS

CONTACT DEQ

- **FRACTURED ROCK.**
- **AREAS WHERE LOST CIRCULATION ZONES ARE COMMONLY ENCOUNTERED.**
- **FLOWING WELLS WITH ELEVATED HYDROSTATIC HEAD.**

RULES

R 325.1663 Rule 163. (2)



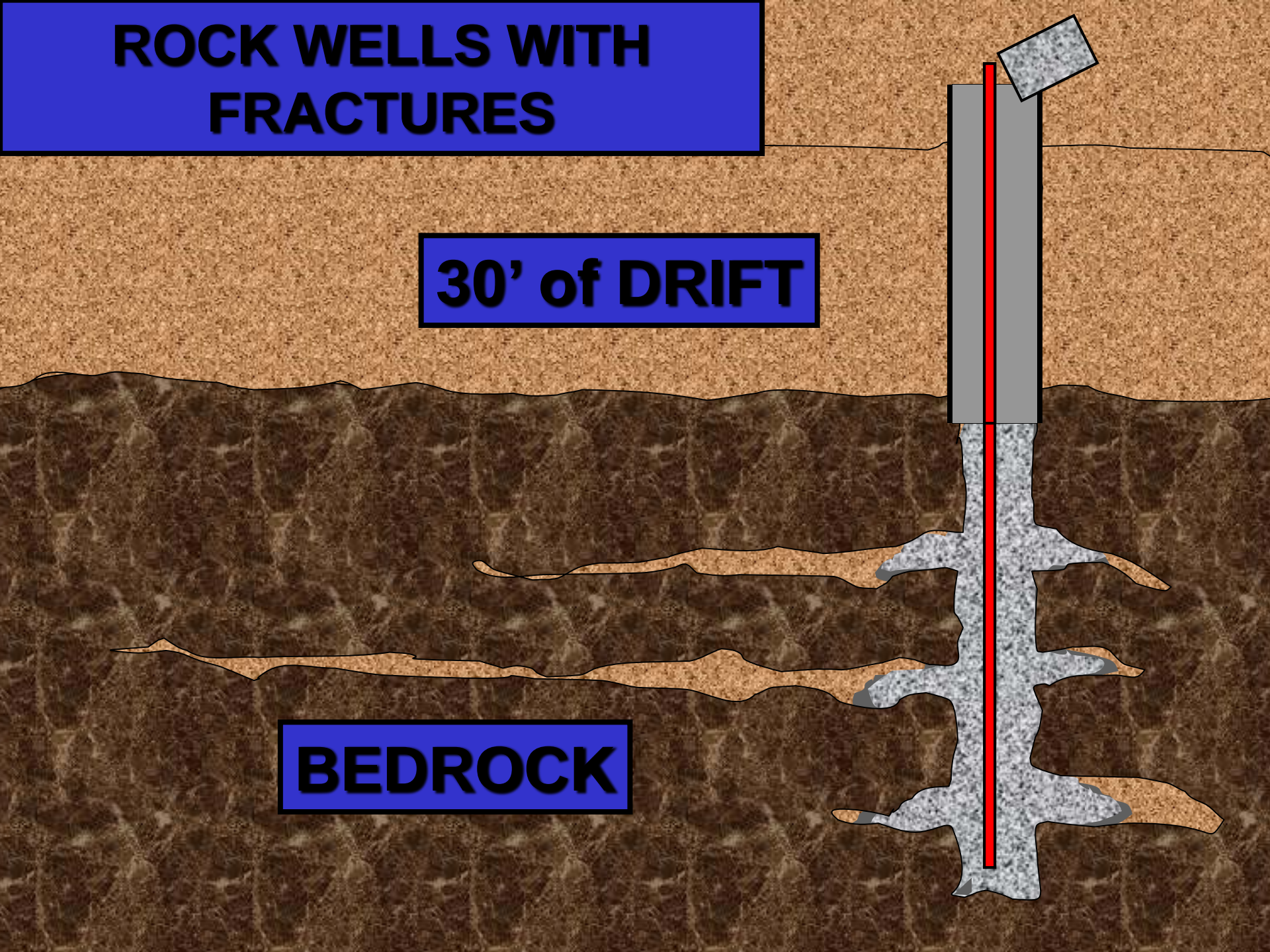
LOST CIRCULATION ZONES

- GRAVEL, SAND, STONE AGGREGATE, OR OTHER MATERIAL APPROVED BY THE DEPARTMENT MAY BE USED IN THAT PORTION OF A WELL THAT PENETRATES L.C.Z. SUCH AS GRAVEL, CAVERNOUS, CREVICED, OR FRACTURED ROCK.

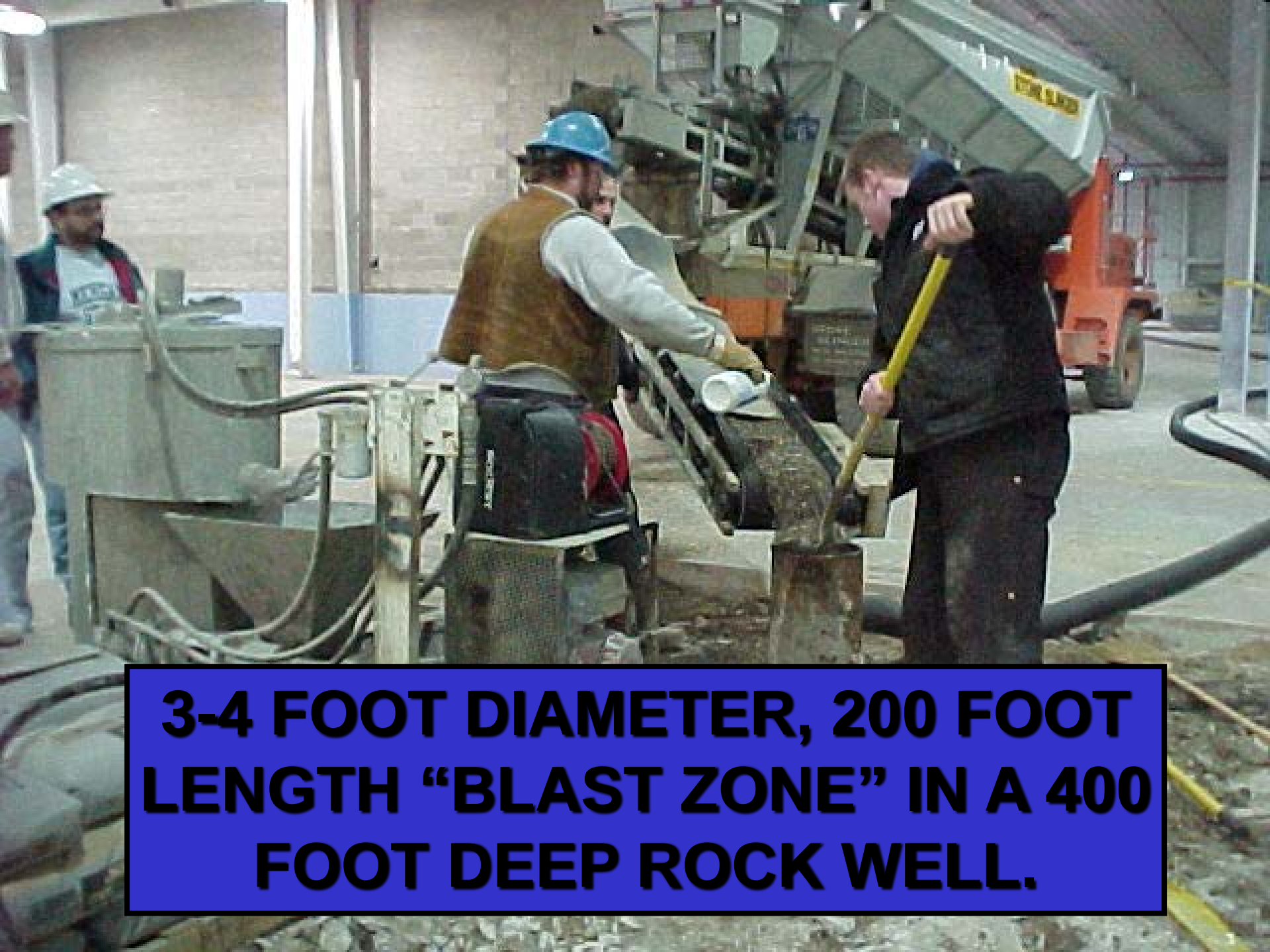
Procedure for Plugging Fractured Rock with pea stone & Portland Cement

- Place tremie pipe to bottom of well.
- Pump neat cement (5.2 gal/sack) while slow-pouring pea stone from the surface.
- Withdraw tremie pipe as the cement is being pumped and stone is being poured, but keep pipe submerged in the slurry. (This prevents pressure locking the tremie pipe in the well.)
- After passing the fractured zone, stop pouring pea stone but continue pumping neat cement until return at the surface is observed.

ROCK WELLS WITH FRACTURES

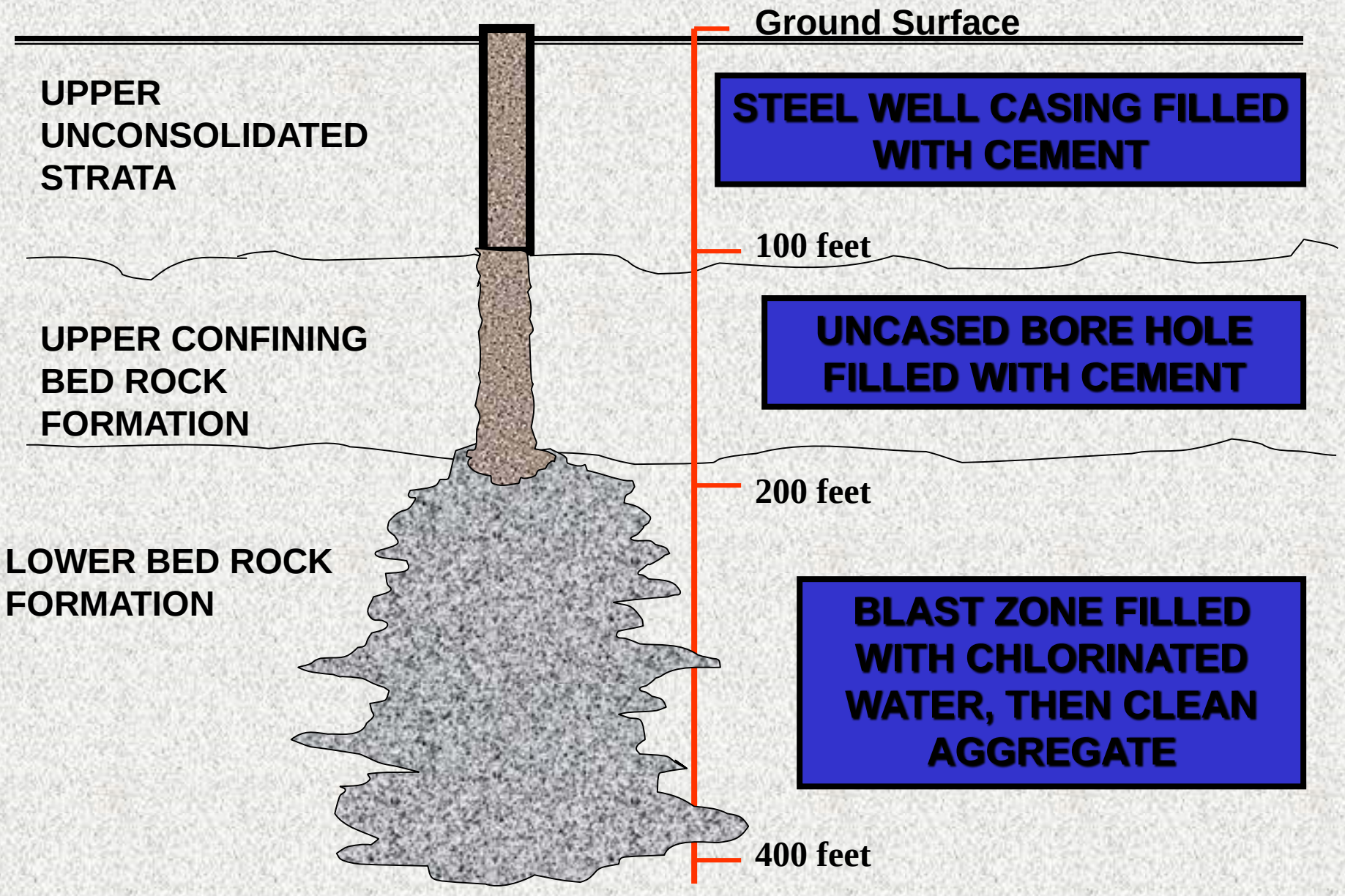


Pea stone may be pre-measured and placed into sacks to allow for easy handling.



3-4 FOOT DIAMETER, 200 FOOT LENGTH "BLAST ZONE" IN A 400 FOOT DEEP ROCK WELL.

ABANDONED WELL WITH BLAST-ENLARGED ZONE



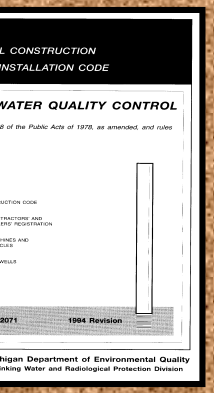
UNIQUE SITUATIONS

CONTACT DEQ

- FRACTURED ROCK.
- AREAS WHERE LOST CIRCULATION ZONES ARE COMMONLY ENCOUNTERED.
- FLOWING ROCK WELLS WITH ELEVATED HYDROSTATIC HEAD.

RULES

R 325.1663 Rule 163. (3-4)



FLOWING WELLS AND WELLS DISCHARGING SUBTERRANEAN GASSES

- FLOW MUST BE STOPPED USING NEAT CEMENT OR CONCRETE GROUT
- CONTACT MDEQ FOR TECHNICAL ASSISTANCE

HOW DO YOU PLUG ABANDONED FLOWING WELLS SAFELY?

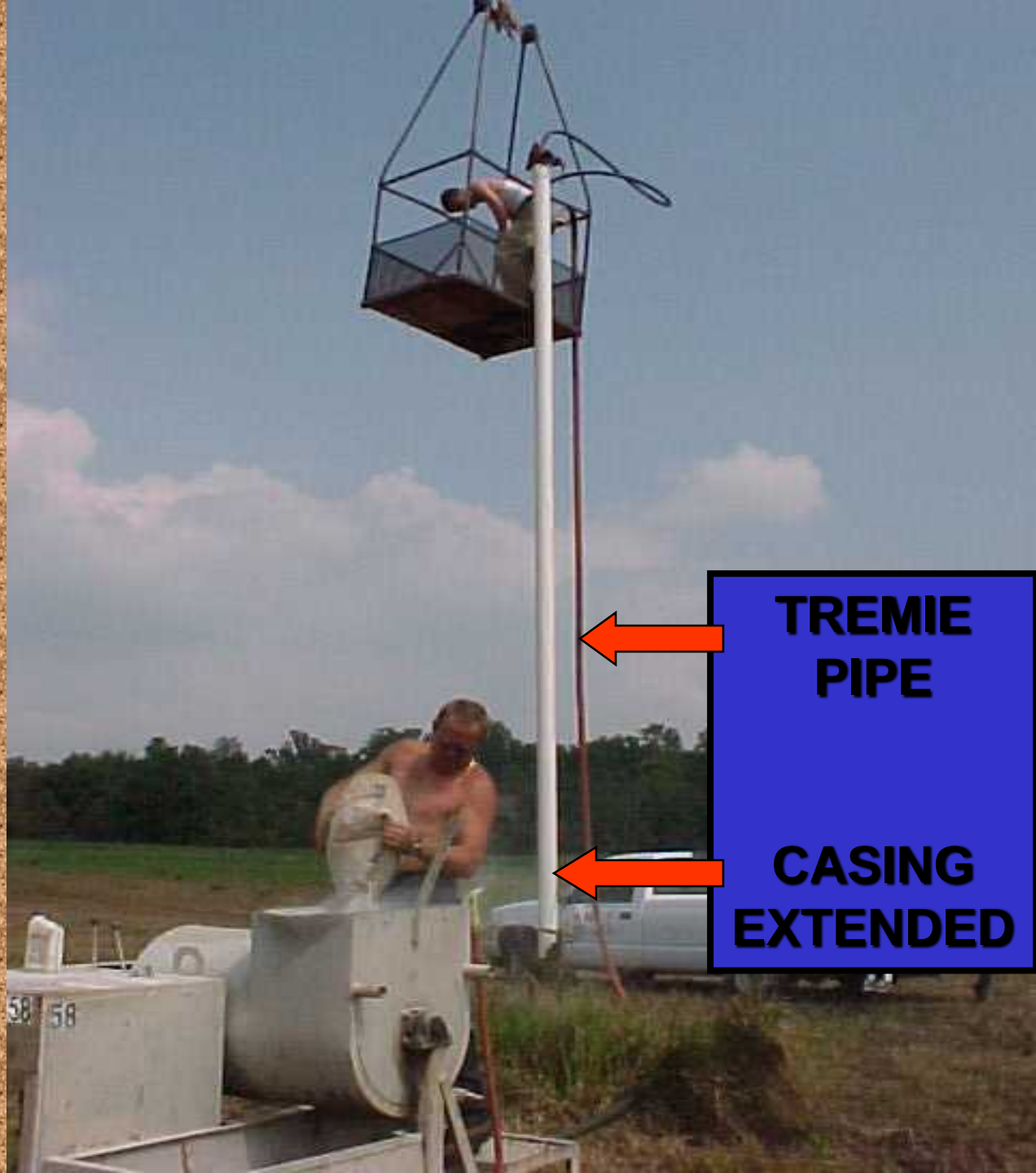
FIRST STEP:

GET THE "FLOW" UNDER CONTROL.

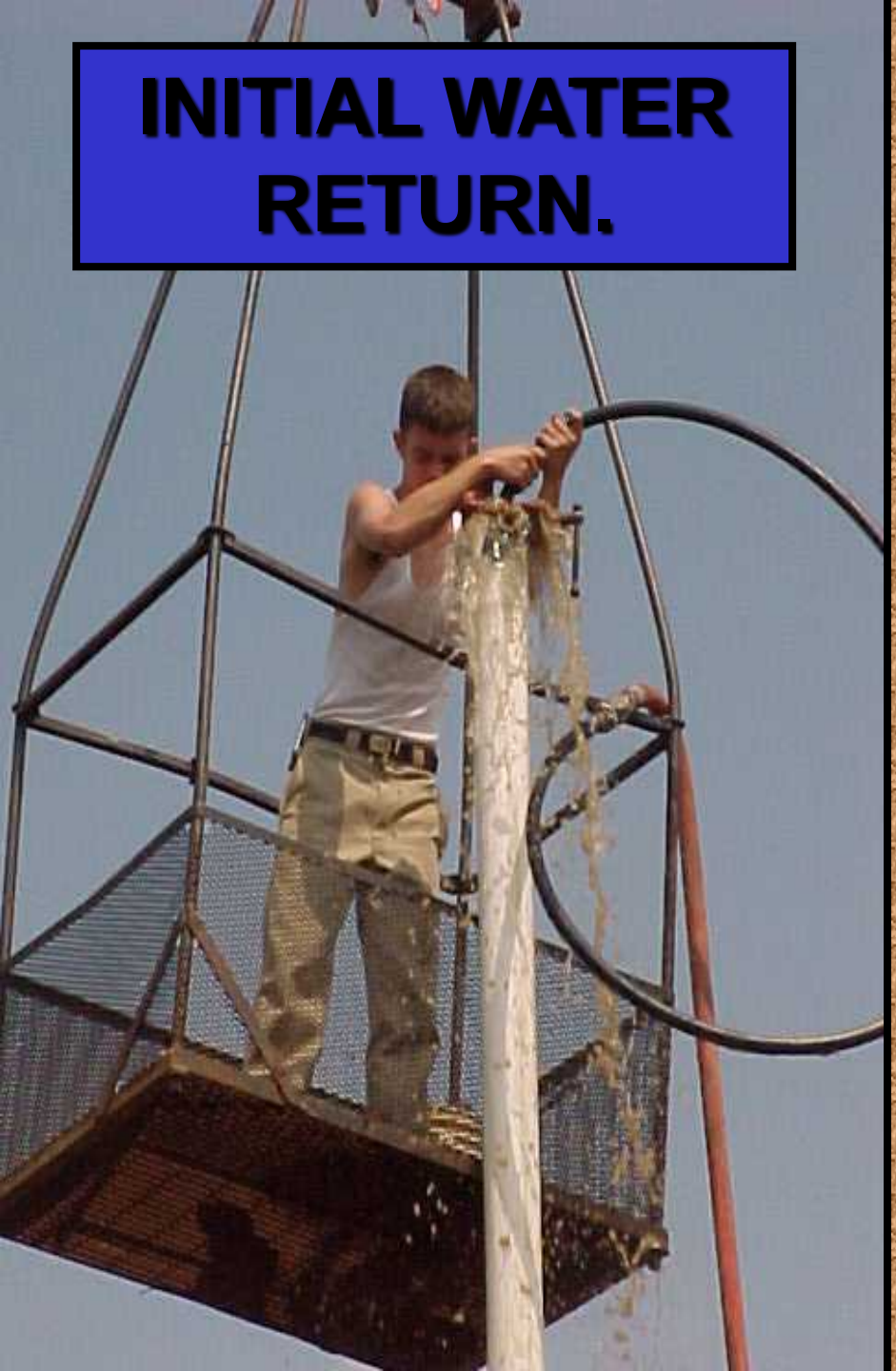
INSTALL CASING EXTENSION

“FLOW” WITH FRACTURES.

CASING EXTENDED 20’ TO EQUALIZE THE HYDROSTATIC HEAD (WHICH WAS 18’ ABOVE GRADE.)



Pea stone with neat cement is used to plug fractures.


INITIAL WATER
RETURN.


NEAT CEMENT
RETURN.