

## AAO Federal SWD #1 Geologic Review

This document serves as Apache Corporation's procedure to review and verify the following geological questions in the notice of intent sundry COA's and OCD order:

- 1) Properly evaluate the injection zone utilizing open hole logs, swab testing and/or any other method to confirm that hydrocarbons cannot be produced in paying quantities. This evaluation shall be reviewed by the BLM prior to injection commencing.
- 2) Restrict the injection fluid to the approved formation

**PERF INTERVAL:** 7,434' to 8,656' MD (OPEN HOLE)

### MUD LOG

There is no oil cut, fluorescence, or gas shows from 7,434' to 8,656' MD recorded in the mud log as shown in Figure 1. The recorded gas units from 7,700' to 7,750' MD was captured while tripping. The mud log is shown over the injection interval from 7,400' to 8,656' MD. Lost circulation prevented returns starting at 7,800' MD. Track 1 records drilling info and notes. Track 2 records drilling rate shown in minutes/foot. Track 3 records visual porosity with increasing quality of poor, fair and good towards the left. Track 4 shows the interpreted lithology. Track 5 records percent oil fluorescence in poor, fair, and good with increasing quality to the right. Track 6 contains sample descriptions and remarks. Track 7 records total gas and chromatography from C1 to C4. C1 is recorded in red, C2 recorded in blue, C3 is recorded in a dashed green line, IC4 is recorded in pink, and NC4 is recorded in purple.

### OPEN HOLE LOGS

Open hole logs were run from 190' to 7,432' prior to setting casing and do not cover the injection interval. This decision was made to prevent loss of tools due to large water flows encountered around 7,800' MD.

### NEARBY SWD WELLS

Shown in Figure 2, there are three SWD wells located within 8,100' of the AAO Federal SWD #1 SHL that dispose into the Wolfcamp-Cisco. The Chalk Bluff Federal SWD #1 (API# 30-015-27163) is located 1,572' to the southeast and disposes into Wolfcamp-Cisco from 6,600' to 8,200'. The Federal T SWD #1 (API# 30-015-26404) disposes into the Wolfcamp-Cisco from 7,758' to 8,060' and is located 3,627' to the southeast in section 12. The State CG #1 (API# 30-015-25361) disposes into the Canyon from 7,948' to 7,982' and is located 8,077' to the southeast in section 7-T17S-R28E.

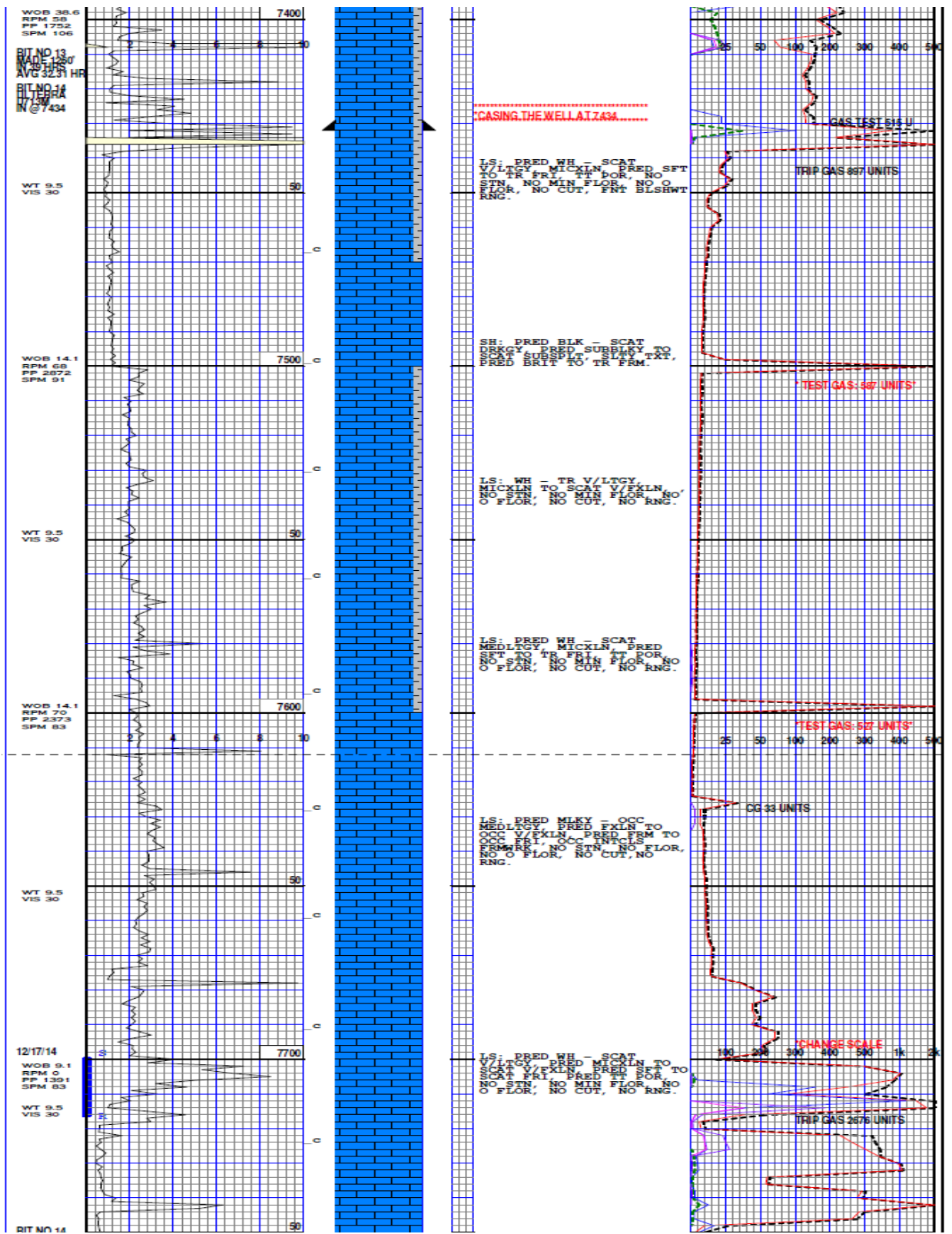
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FIGURE 1: Mud log from 7,400' to 9,656'



MADE 257  
NO 23.155  
AVG 21.35 H  
BIT NO. 15  
BANKS  
IN AT 7701'

12/18/14  
12/19/14

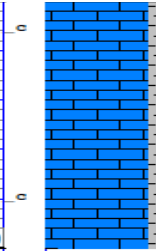
WOB 13.7  
RPM 59  
PP 2853  
SPM 0

WT 14.0

WOB 15  
RPM 54  
PP 2872  
SPM 0

WT 14

WOB 16.6  
RPM 62  
PP 2911  
SPM 0



LS: PRED V/LTGY - TR WH,  
PRED MICKLN TO SCAT  
V/FXLN, PRED SFT TO SCAT  
FRI, TT, POR, NO STM, NO  
MIN, FLOR, NO O FLOR, NO  
CUT, NO RNG.

SCALE CHANGE

GAS WHILE TRIPPING OUT 2899

WATER FLOW @ 7840

NO CIRCULATION, NO RETURNS

GAS TEST 506 U

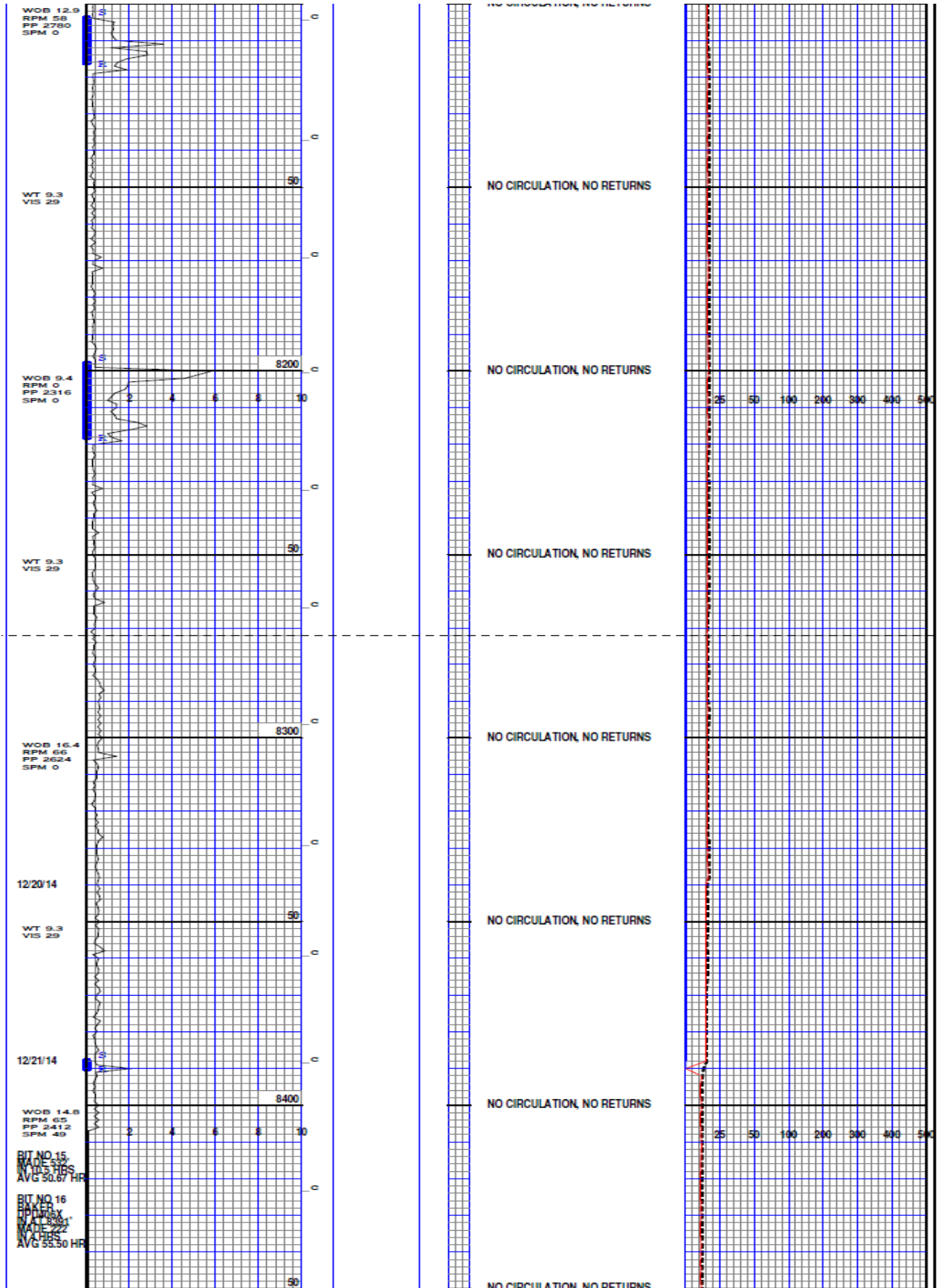
NO CIRCULATION, NO RETURNS

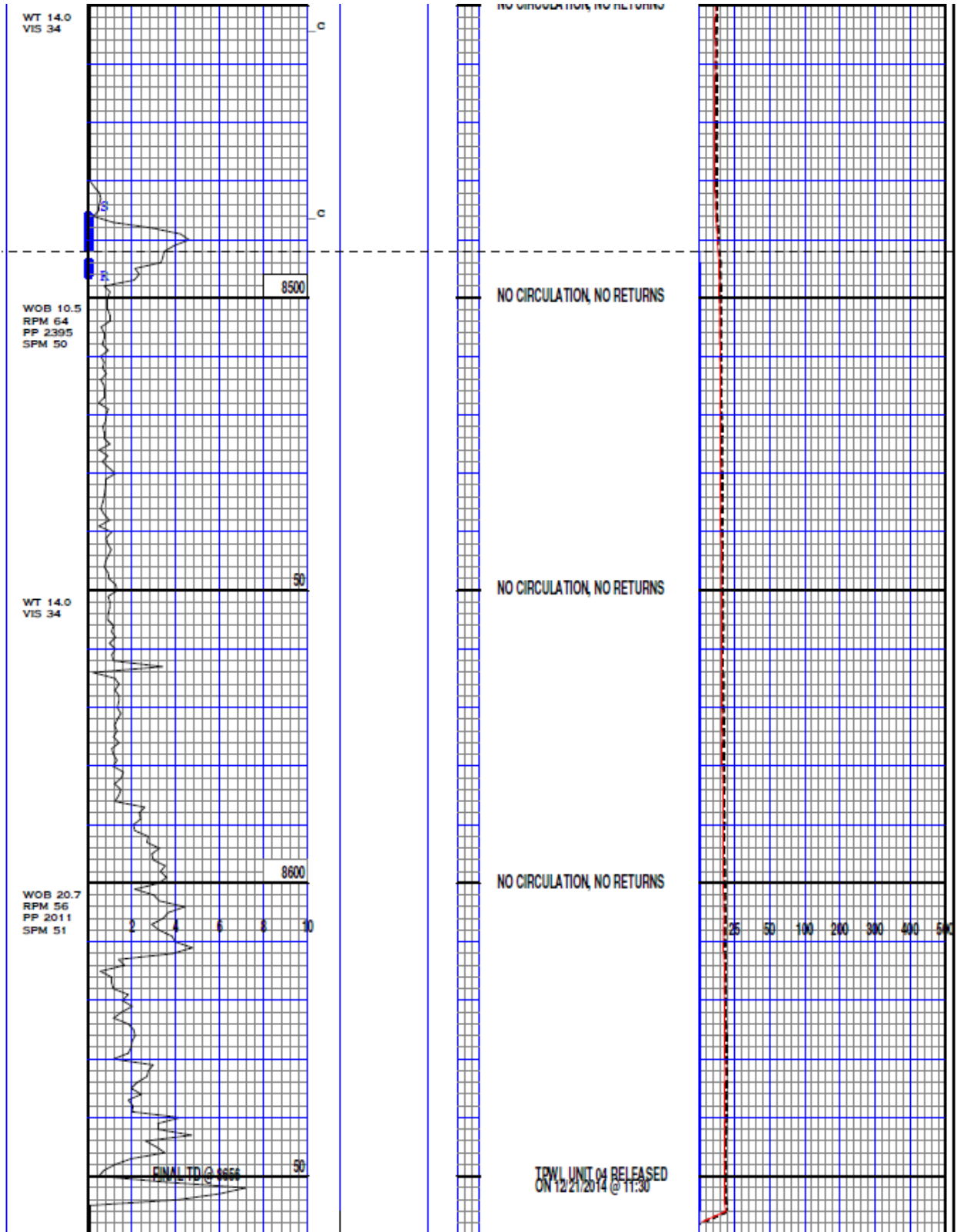
NO CIRCULATION, NO RETURNS

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NO CIRCULATION, NO RETURNS

NO CIRCULATION, NO RETURNS





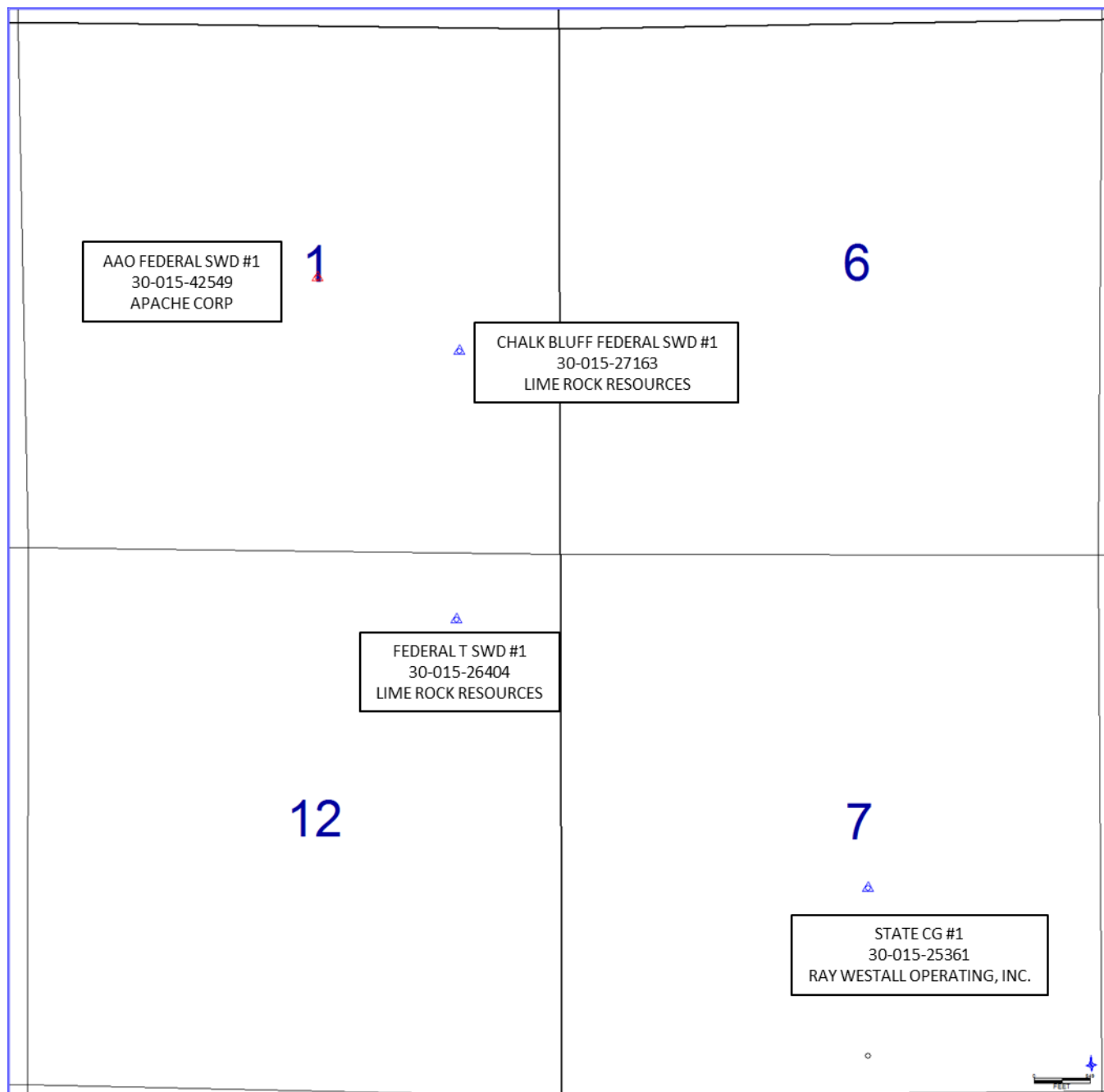


FIGURE 2: Location of nearby SWDs disposing into the same interval as the AAO Federal SWD #1.