

30x15

Amoco Production Company

ENGINEERING CHART

SHEET NO. OF

FILE

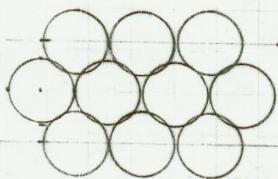
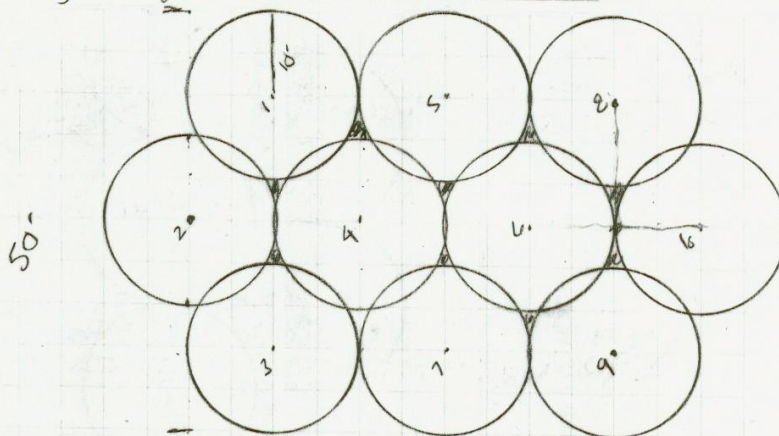
APPN

DATE 11-93

BY MAG

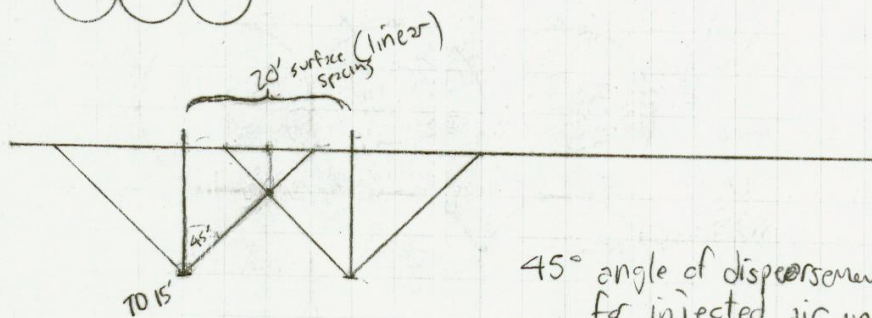
SUBJECT S. Sprint air sparge project
spacing designs

1" = 20'



1" = 50'

10 sparge package
total area covered by 10 sparge wells

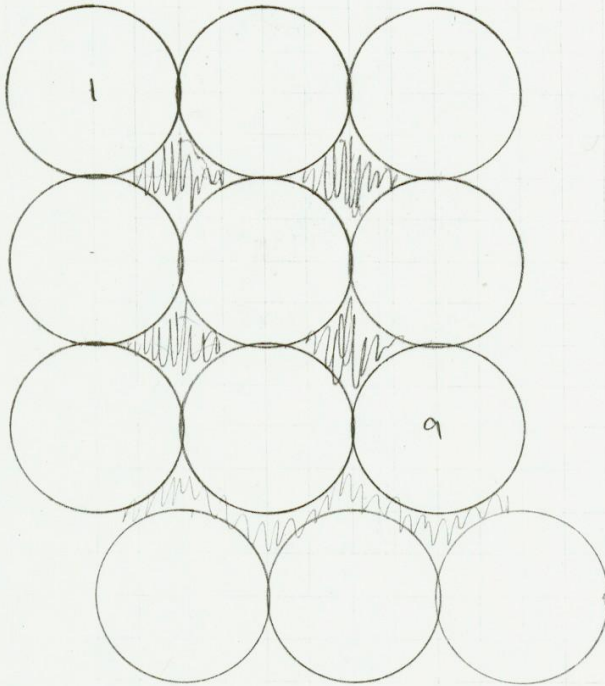
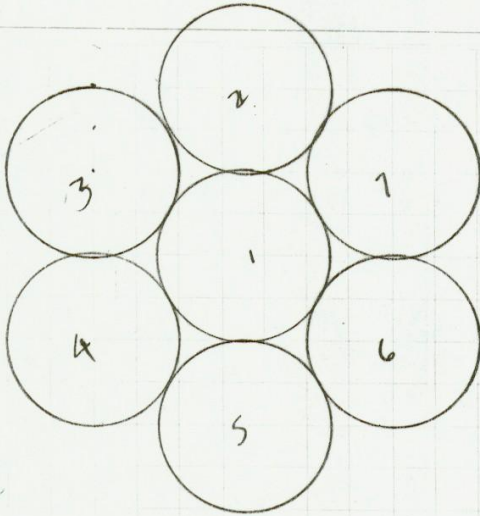


45° angle of dispersion
for injected air in sand

Amoco Production Company
ENGINEERING CHART

SUBJECT _____

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FILE _____
APPN _____
DATE _____
BY _____



BRIEFING OF SCHEMATIC AND PHOTO STUDY
KOC AIR SPARGE SYSTEM CONTROL BOARDS

Figure A: Flow Schematic of Air Sparge System Control Board.

Photos #1-#4: Various views of Electrical Enclosure that has been converted as an enclosure for five (5) control valving and flow and rate measurement.

Photos #5-#6: Two views of control board with all five (5) air sparge points' valving bypassing the Brooks flow meter and psi gauge. Lower needle valves control flow rate or pressure. Middle valve is a three way valve (ie. closed; bypass flow meter and directs flow to air sparge point; or flow through flow meter and psi gauge in conjunction with opening bypass valve). The top valve is a bypass valve that is closed when three-way valve is bypassing flow meter directly to air sparge point and bypass valve is open when three-way valve is directing flow through flow meter and gauge for individual air sparge point measurement.

Photo #7: View of control board with Air Sparge point #21 flow directed individually through flow meter and psi gauge while other four air sparge points (#22-#25) are on bypass.

Photo #8: Close-up view of Brooks flow meter and psi gauge with the flow of Air Sparge point #21 directed through same for individual measurement.

Photo #9: View of control board with Air Sparge Point #25 flow directed individually through flow meter and psi gauge while the other four air sparge points (#21-#24) are on bypass.

Photo #10: View of control board with Air Sparge Point #22 flow directed individually through flow meter and psi gauge while the other four air sparge points (#21 & #23-#25) are on bypass.

Photos #11-#12: Front profile & Back profile views of control board

Photos #13-#16: Various views of the back side of the control board showing the plumbing of control board.

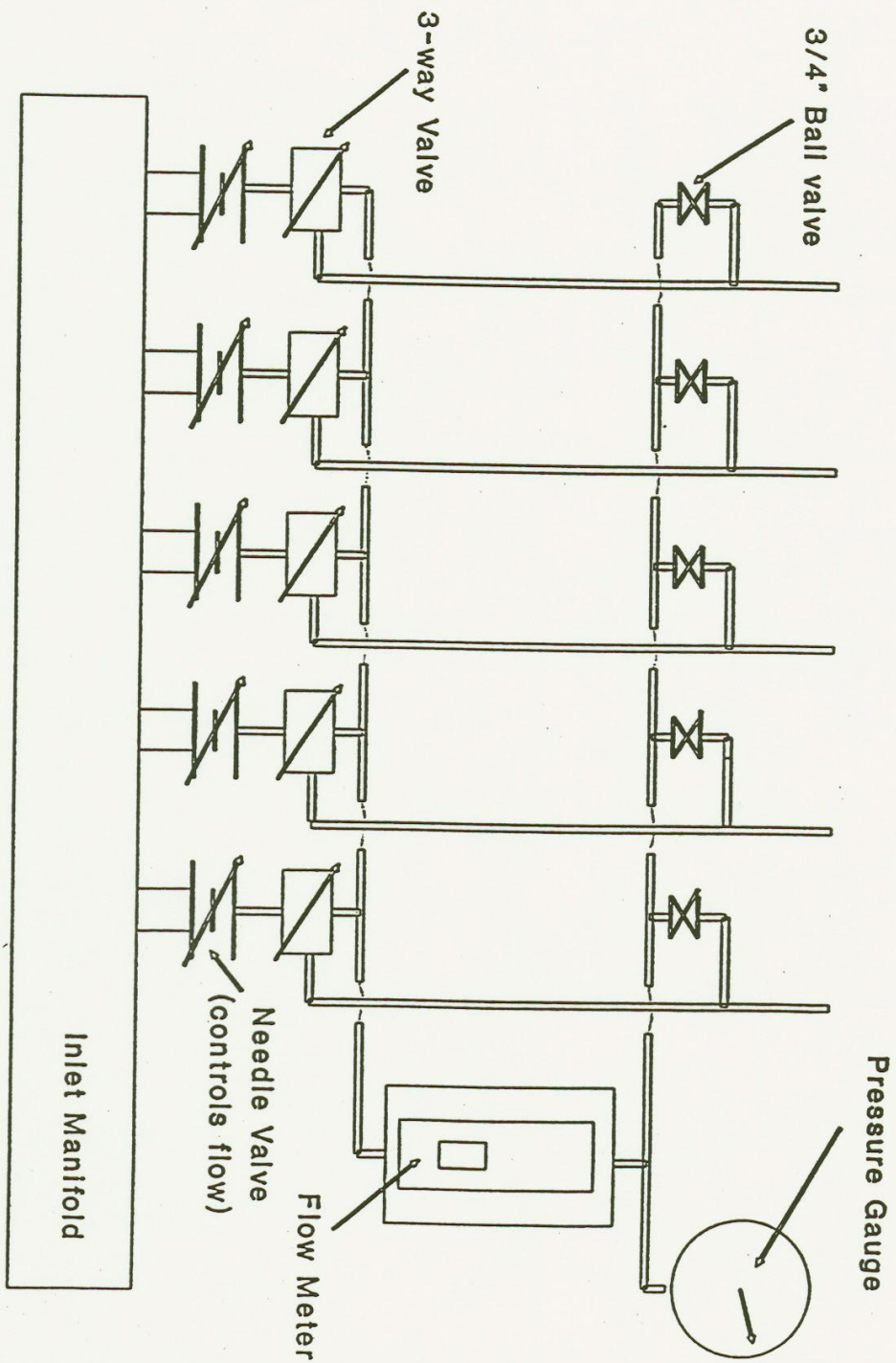
Photos #17-#18: Two views of the piping at the surface of the air sparge point showing 1/2" air hose with quick connections, through check valve, then 3/8" SS tubing to the air sparge point.

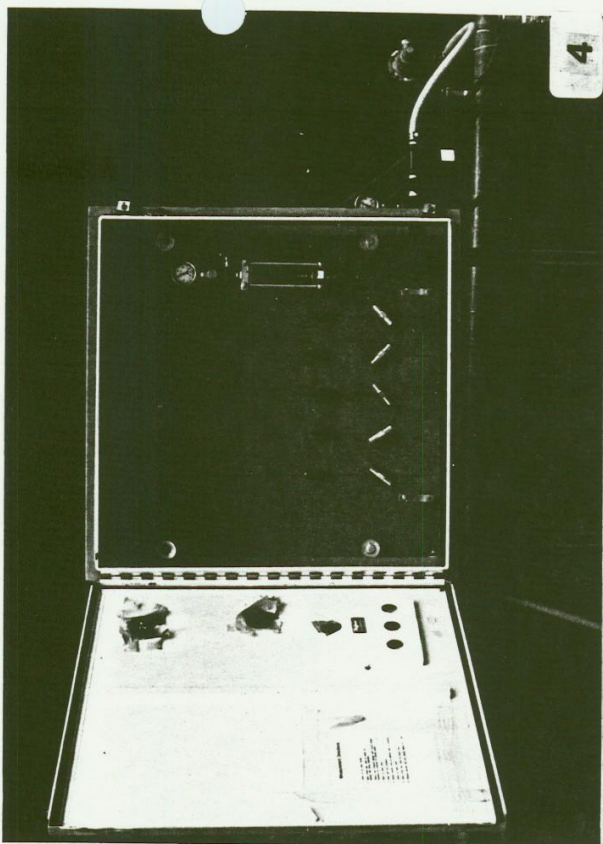
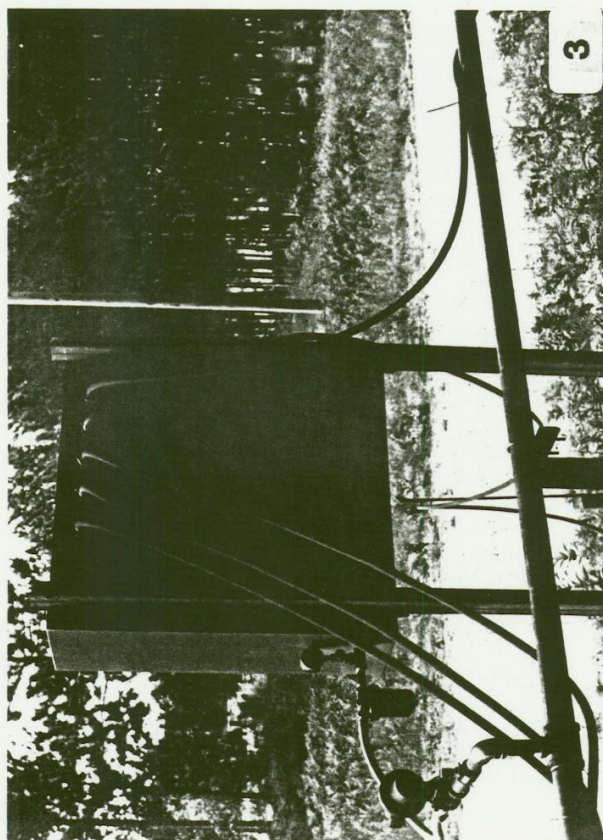
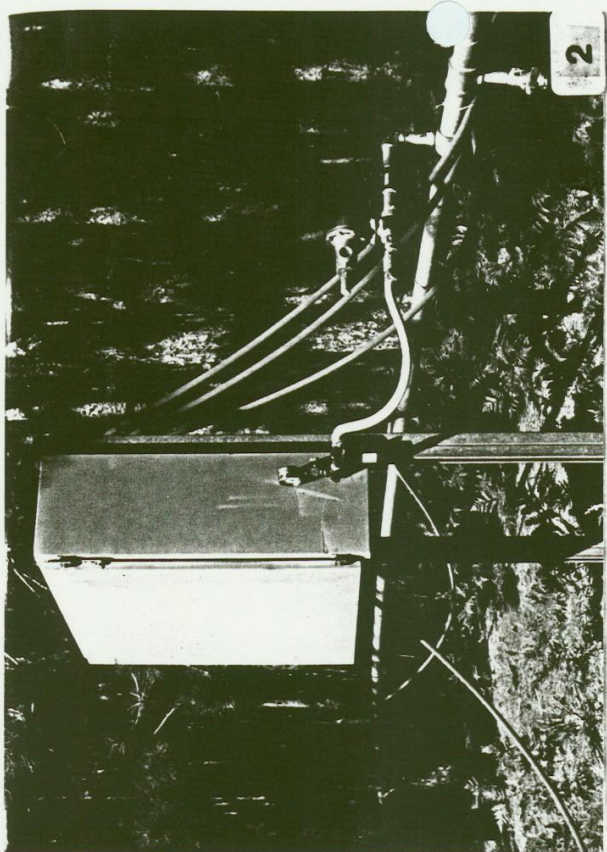
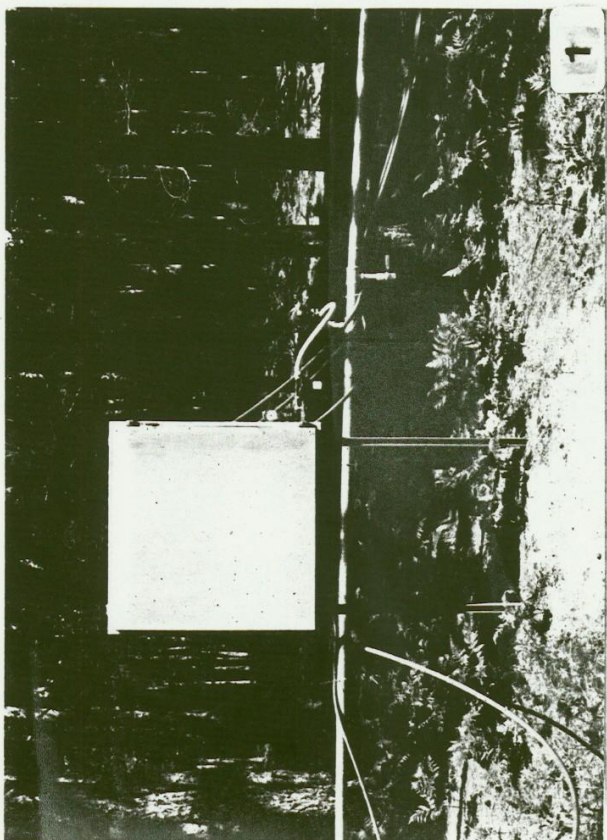
Photo #19: View of fabricated air sparge point.

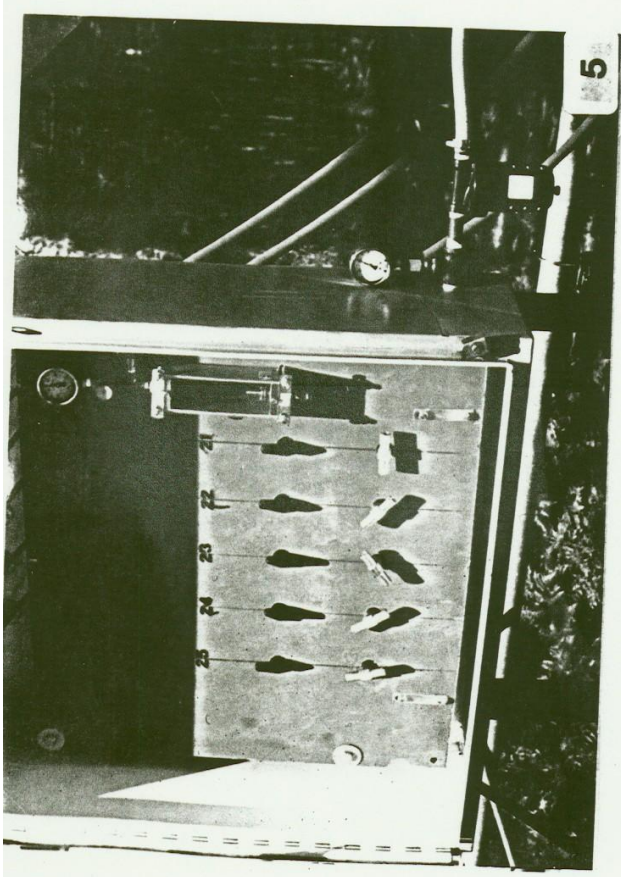
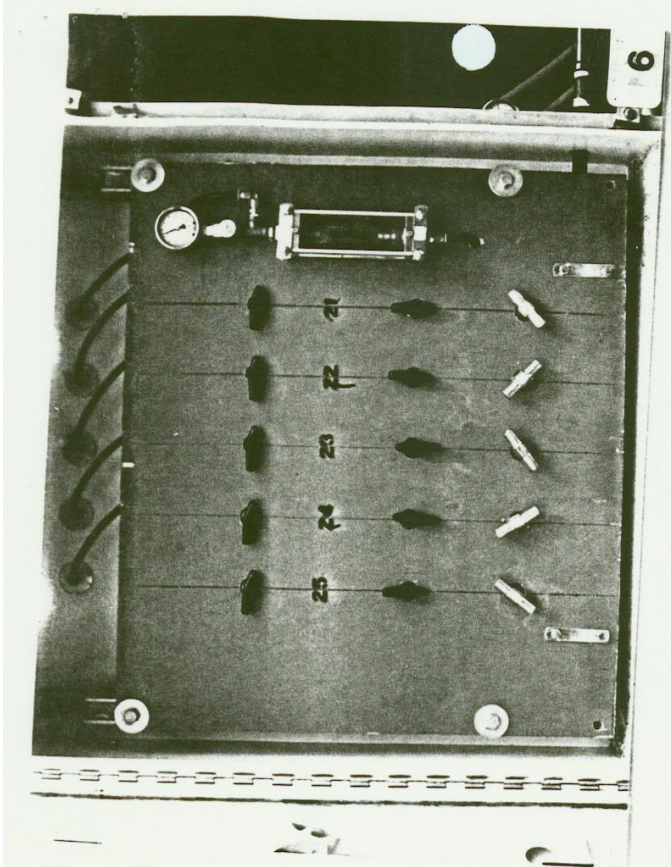
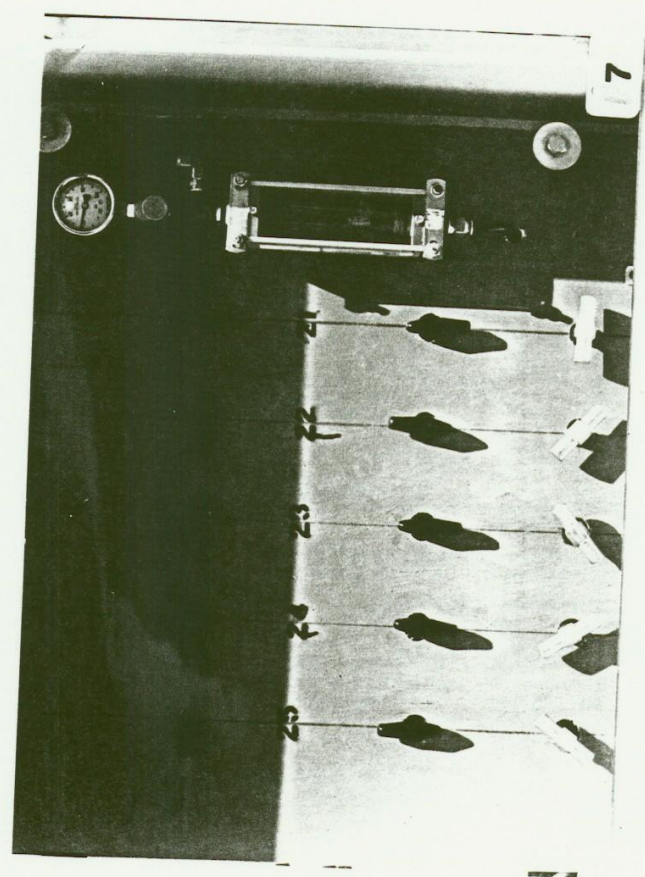
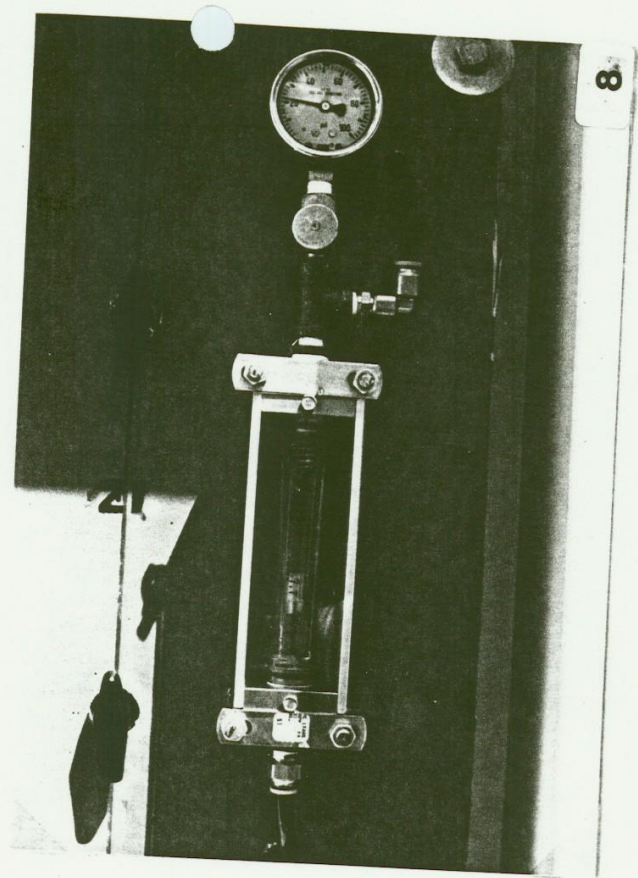
Photo #20: View of empty air sparge system control board.

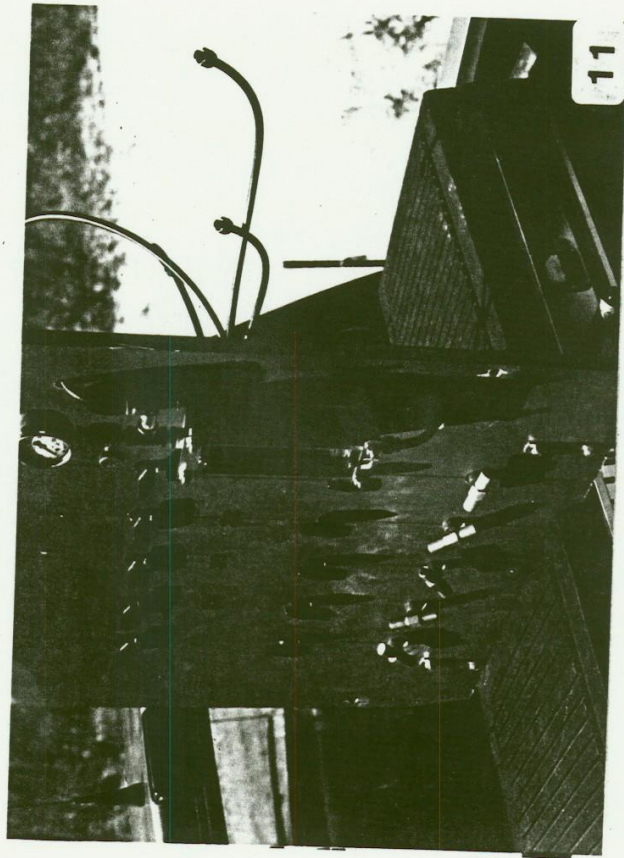
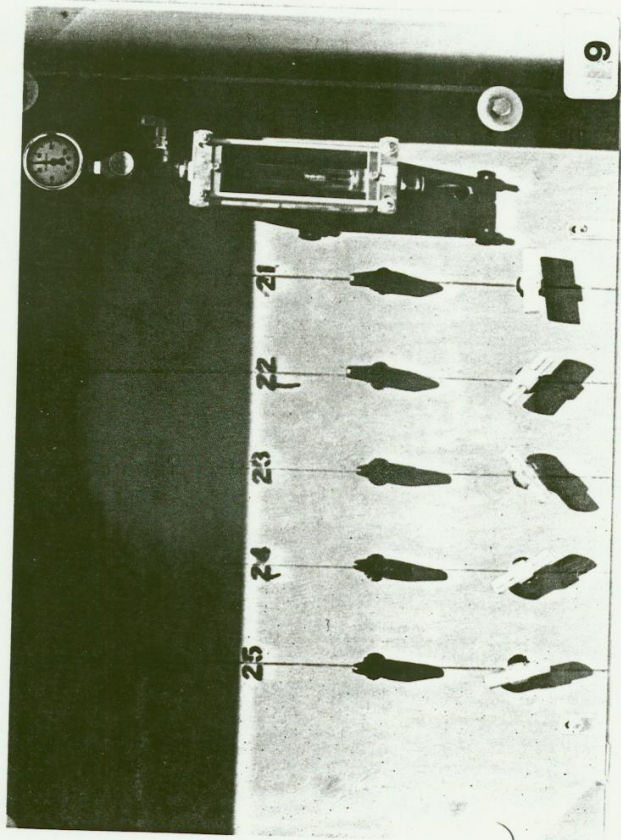
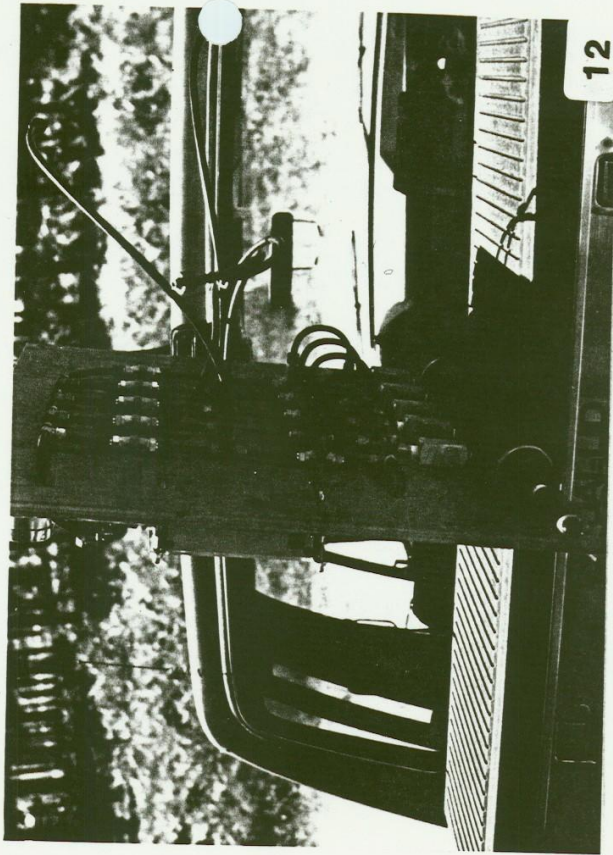
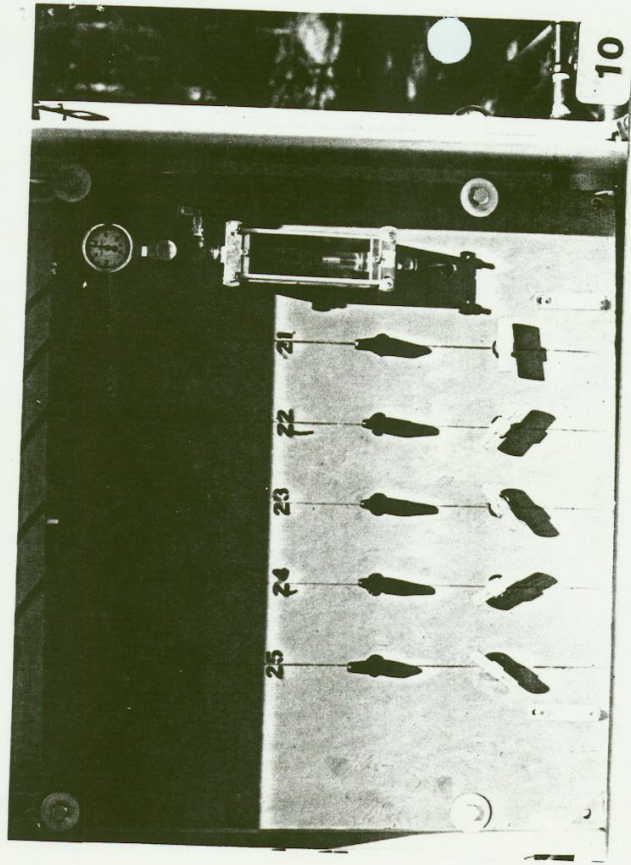
Figure B: Copy of "Measurement Directions" posted on the inside of the enclosure door that details procedure for individual measurement of air sparge points.

FIGURE A: CONTROL BOX DESIGN AIR SPARGING TECHNIQUE

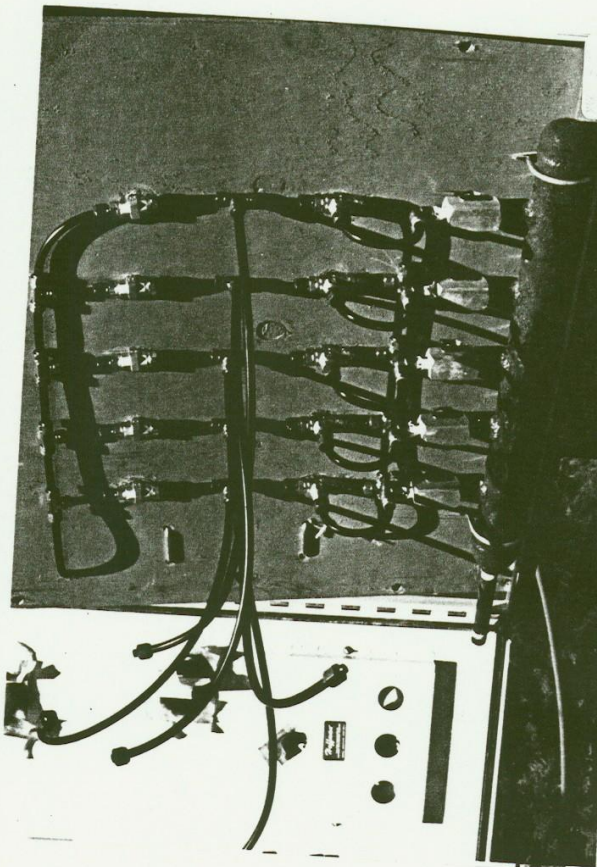




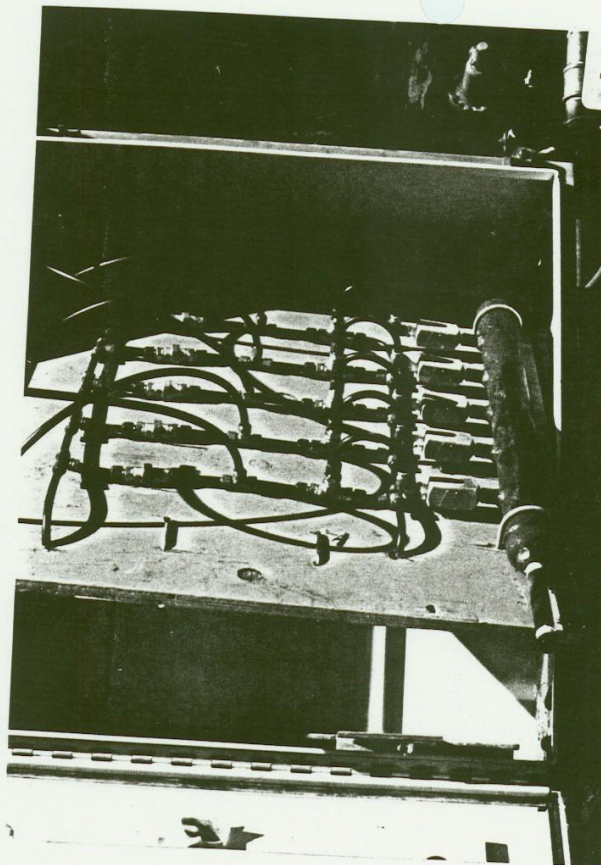




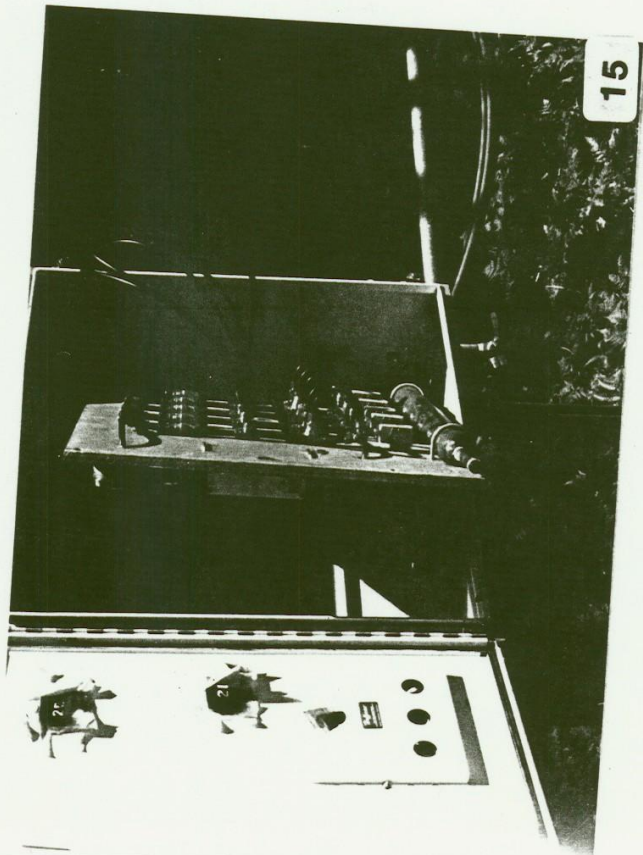
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14



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