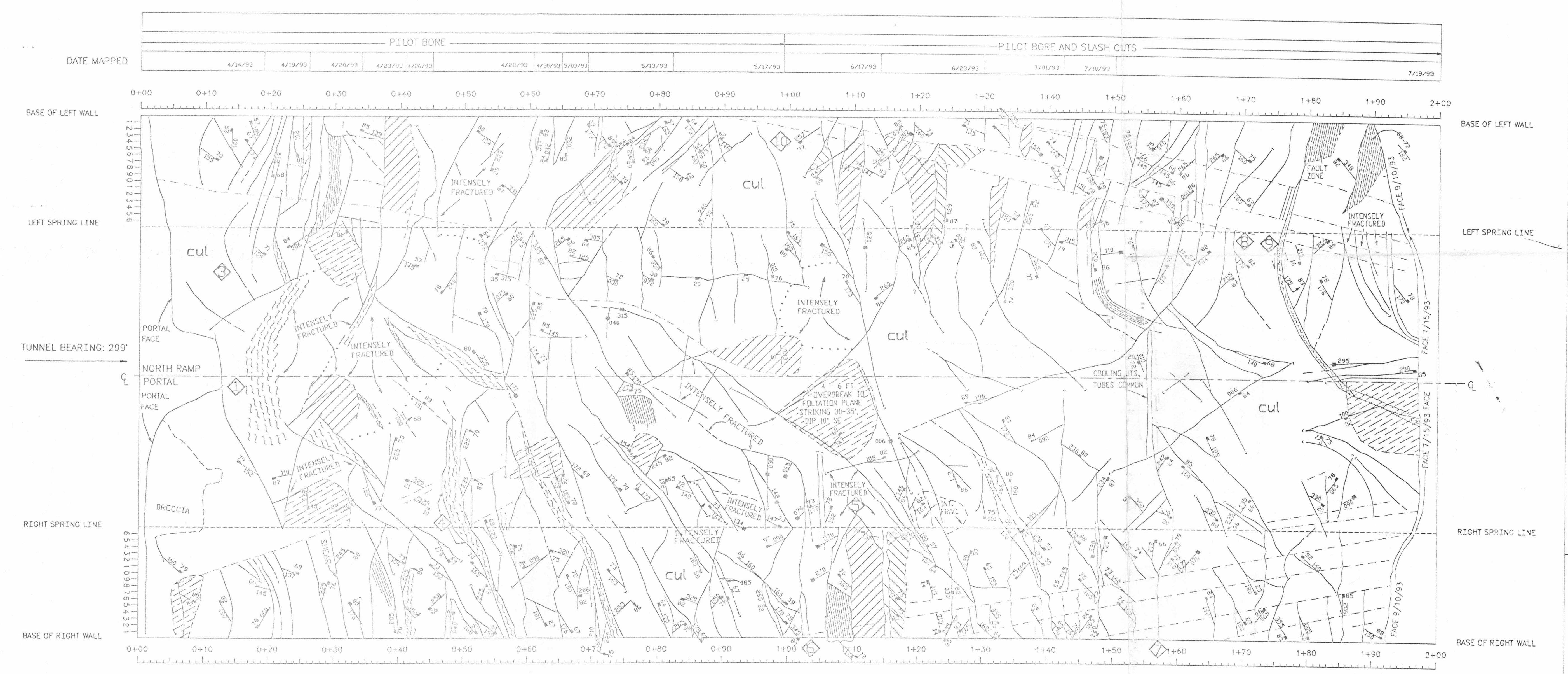
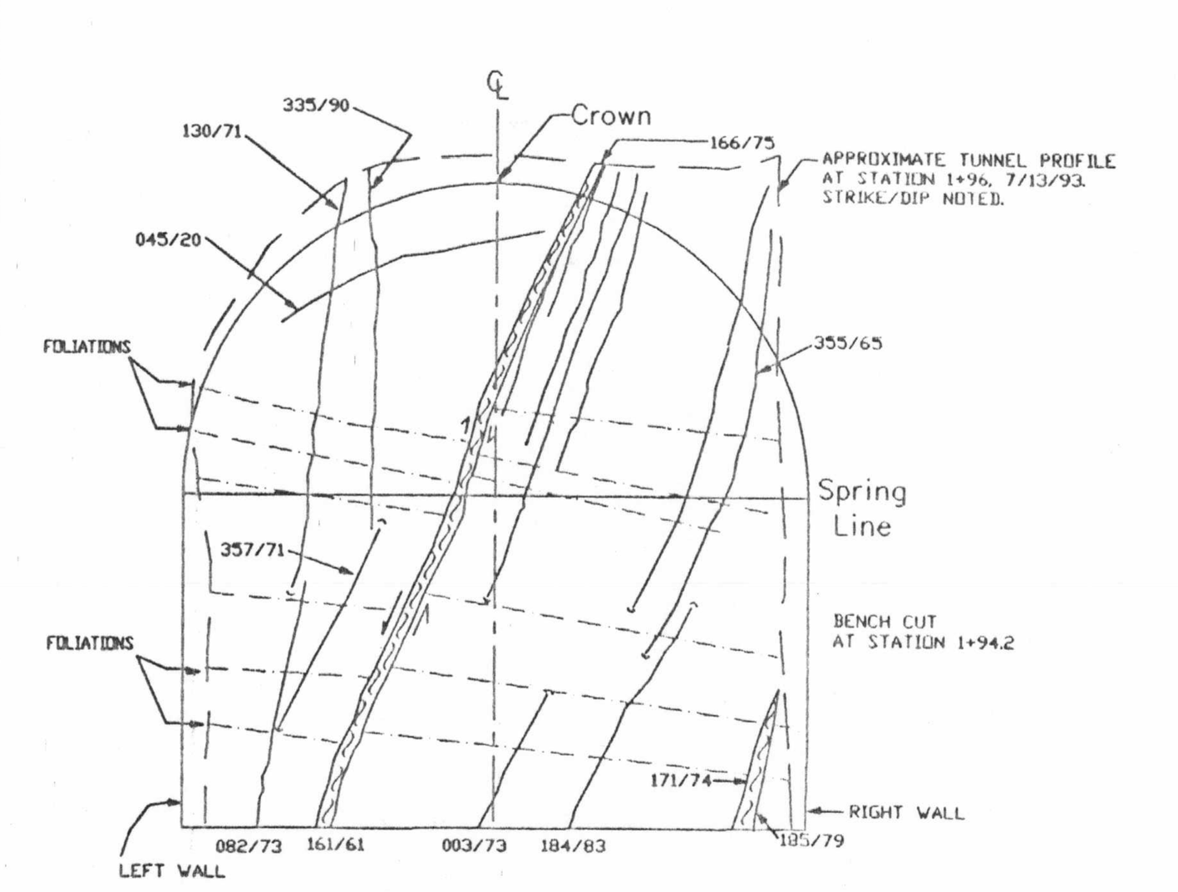
NOTES

1. Distinct shear zone intersects crown centerline at Sta. 0+17 and continues into right wall as intensely fractured zone. Fracture surfaces coated with up to 3 cm of opal and calcite.
2. Shear zone with breccia, no observed displacement near crown, terminates in possible cooling fracture Sta. 0+57.
3. Sta. 0+05 to 0+20: Lithophysae aspect ratios range from 1:4 (L:H) to 3:1 in upper half of tunnel.
4. Cooling fracture with bedded sand infilling, exhibits decorations on fracture surfaces consisting of elongate, anastomosing to subparallel channels extending 5mm into the wall rock. The fracture bounds a shear zone striking 235°, dipping 70-83° SW.
5. Shear zone with crushed rock and breccia.
6. Zone of intensely fractured rock intersecting tunnel at Sta. 0+50 in the left wall and Sta. 1+15 in the right wall.
7. Brownish gray to gray, densely welded, rhyolitic, ash-flow tuff. Lithophysae comprise approximately 5-10% of the rock by volume; average diameter 7-20 cm; lithophysae less than 1.5 cm are typically filled with drusy quartz and opal.
8. Foliation more prominent in crown, and combined with high-angle fracture causes fallout resulting in small wedge-shaped casts in the crown.
9. Fault with crushed wall rock and sandy infilling. Foliation trace is offset approximately 1.5 ft.
10. Lithophysae: oblate to spheroidal; average size 5 cm diameter from Sta. 0+92 to Sta. 1+00; from Sta. 1+00 to 1+05 average size is 20 cm, maximum size is 45 cm.



SKETCH OF TUNNEL FACE STATION 1+96



EXPLANATION

STRIKE OF VERTICAL FRACTURE.

FRACTURE TRACE WITH SYMBOL SHOWING STRIKE AND DIP; DASHED WHERE APPROXIMATE; CAPPED WHERE TERMINATION OBSERVED.

STRIKE AND DIP OF FRACTURE, ARROW SHOWING PLUNGE OF FRACTURE DECORATIONS.

STRIKE AND DIP OF BEDDING OR FOLIATION.

FRACTURE TRACE, ORIENTATION NOT RECORDED. (DASHED WHERE INDISTINCT.)

FAULT OR SHEAR – SHOWING STRIKE AND DIP; ARROWS INDICATE DISPLACEMENT.

SHEAR ZONE; LIMITS SHOWN BY LINES WHERE BOUNDED BY FRACTURES. SHEAR ZONE FILLINGS ARE COMPOSED OF BOTH CLAST- AND MATRIX-SUPPORTED BRECCIAS. WHERE THE ZONES WIDEN TO 30 CM (1 FT.) OR MORE, THE BRECCIA IS USUALLY CLAST-SUPPORTED, WITH THE MATRIX COMPOSED OF CLAY TO GRAVEL-SIZE MATERIALS, AND CLAST SIZES TO >30CM (1 FT.). WHERE THE ZONES ARE LESS THAN 30 CM (1FT.) THICK, THE SHEARS ARE TYPICALLY MATRIX-SUPPORTED, WITH SMALL LENTICULAR AND TABULAR CLASTS (<15 CM) IN A MATRIX OF CLAY TO SAND-SIZE MATERIALS. SOME SHEARS DISPLAY THIN FILLINGS OF GOUGE PROBABLY DERIVED FROM THE ADJACENT WALL ROCK. ALL MATERIALS OBSERVED IN THE SHEAR ZONES ARE SIMILAR IN APPEARANCE TO THE WALL ROCK IN COLOR AND COMPOSITION. THE BRECCIAS ARE UNCEMENTED AND FREQUENTLY DISPLAY OPEN VOIDS ALONG THE CLAST BOUNDARIES. THE SHEAR ZONES ARE COMMONLY BOUNDED BY DISTINCT FRACTURE PLANES.

TRACE OF FOLIATION.

LOCATION OF NOTES.

cul — UPPER LITHOPHYSAL ZONE OF THE TIVA CANYON MEMBER OF THE PAINTBRUSH TUFF. THE ROCK IS A RHYOLITIC, DENSELY WELDED, ASH-FLOW TUFF. THE ROCK IS BROWNISH-GRAY TO GRAY, DEVITRIFIED, WITH LIGHT-GRAY, FLATTENED PUMICE FRAGMENTS TO 5 CM IN SIZE. LITHOPHYSAE ARE PRESENT THROUGHOUT THE ROCK IN THIS SECTION OF TUNNEL. THE LITHOPHYSAE VARY IN SIZE AND PERCENT VOLUME OF THE ROCK MASS, HAVING BOTH THE HIGHEST PERCENT VOLUME AND LARGEST SIZE NEAR THE PORTAL IN THE UPPER HALF OF THE TUNNEL.

FRACTURE FACES; OCCURS WHERE TUNNEL WALL HAS BROKEN TO A FRACTURE SURFACE OVER A LARGE AREA (GREATER THAN 1 SQUARE METER) WHERE FACES ADJOIN, HATCHING IS REVERSED. LIMITS DASHED WHERE APPROXIMATE.

CLOSELY SPACED FRACTURES SHOWING APPROXIMATE TRACES WHERE NUMEROUS FRACTURES HAVE SIMILAR ORIENTATIONS.

FALLOUT OR OVERBREAK BOUNDARY, DASHED WHERE APPROXIMATE.

DEFINITIONS

INTENSELY FRACTURED – CEMENTED OR UNCEMENTED, PREDOMINATELY ANGULAR (MAY BE PLATY), ROCK FRAGMENTS CREATED BY MULTI-INTERSECTING FRACTURES. APPROXIMATE LIMITS OF INTENSELY FRACTURED AREAS ARE INDICATED BY DOTTED LINES AND/OR FRACTURE TRACES.

FOLIATION – 0.5 TO 15 CM THICK, PLANAR STRUCTURES THAT RESULT FROM FLATTENING OF CONCENTRATIONS OF PUMICE FRAGMENTS.

BRECCIA – AT THIS LOCATION ONLY – A CLAST-SUPPORTED BRECCIA, WITH SLIGHT CEMENTATION, MATRIX IS A PRIMARILY SAND SIZE, NOT ASSOCIATED WITH A DISTINCT SHEAR.

ANSTEC APERTURE CARD

9405090154.02

D.2

ALWAYS THINK SAFETY

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
FOR
DEPARTMENT OF ENERGY

YUCCA MOUNTAIN PROJECT
STARTER TUNNEL–EXPLORATORY STUDIES FACILITY FULL–PERIPHERY GEOLOGY MAP

GEOLOGY: USBR Mapping Team — PRINCIPAL INVESTIGATOR: [signature]
DRAWN: D. L. LOWTHER — T. P. O.: [signature]
CHECKED: [signature] — ADMIN. APPROVED: [signature], CHIEF, GEOLOGY BRANCH

CADD SYSTEM AUTOCAD/R12 — CADD FILENAME ...YUCCA/PRELIM — DATE AND TIME PLOTTED 1-24-94/10:30

DENVER, COLORADO — JANUARY 21, 1994 — 0A-46-171