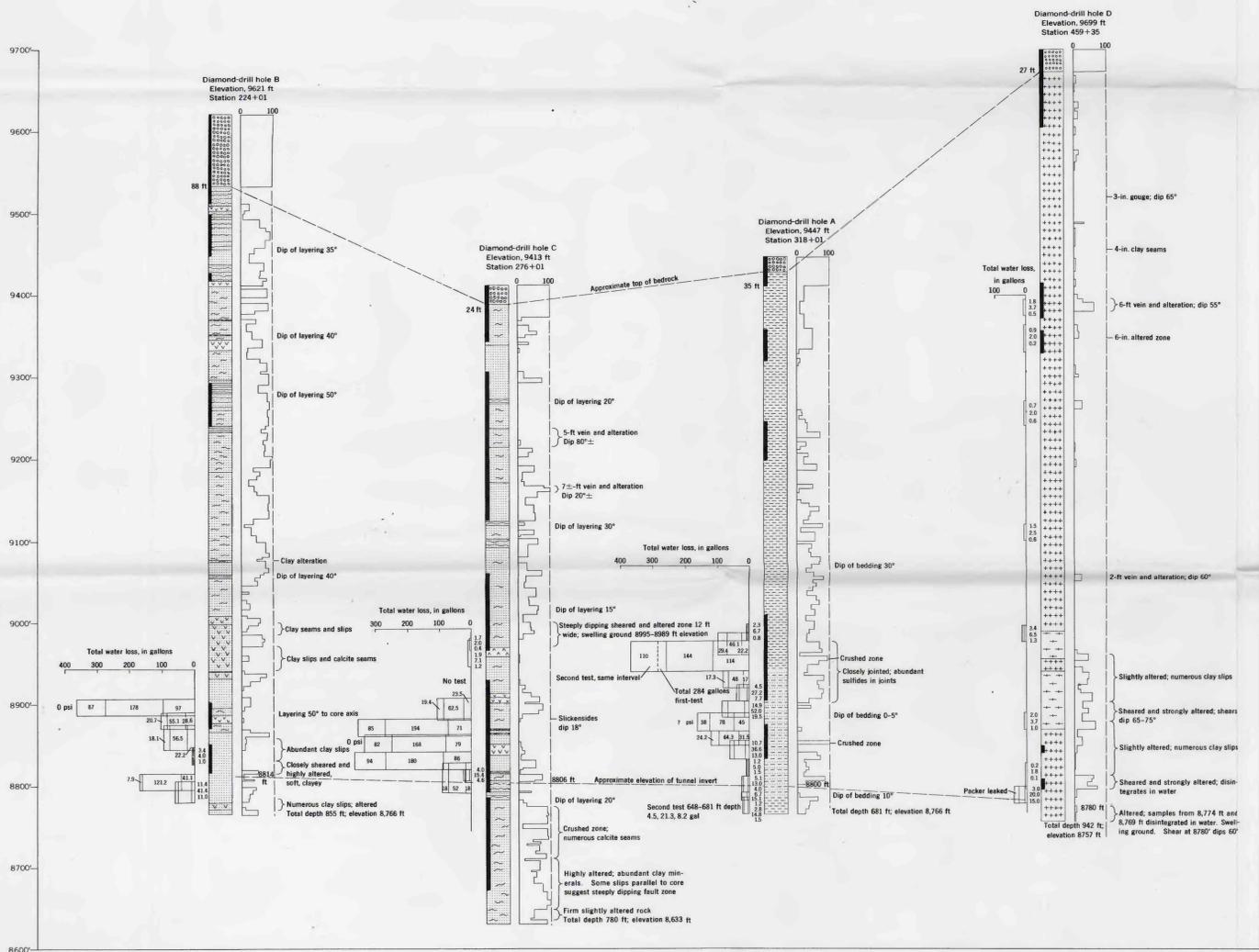


A. ALONG PROPOSED ROBERTS TUNNEL LINE, 1943-44

Logged by E. E. Wahlstrom

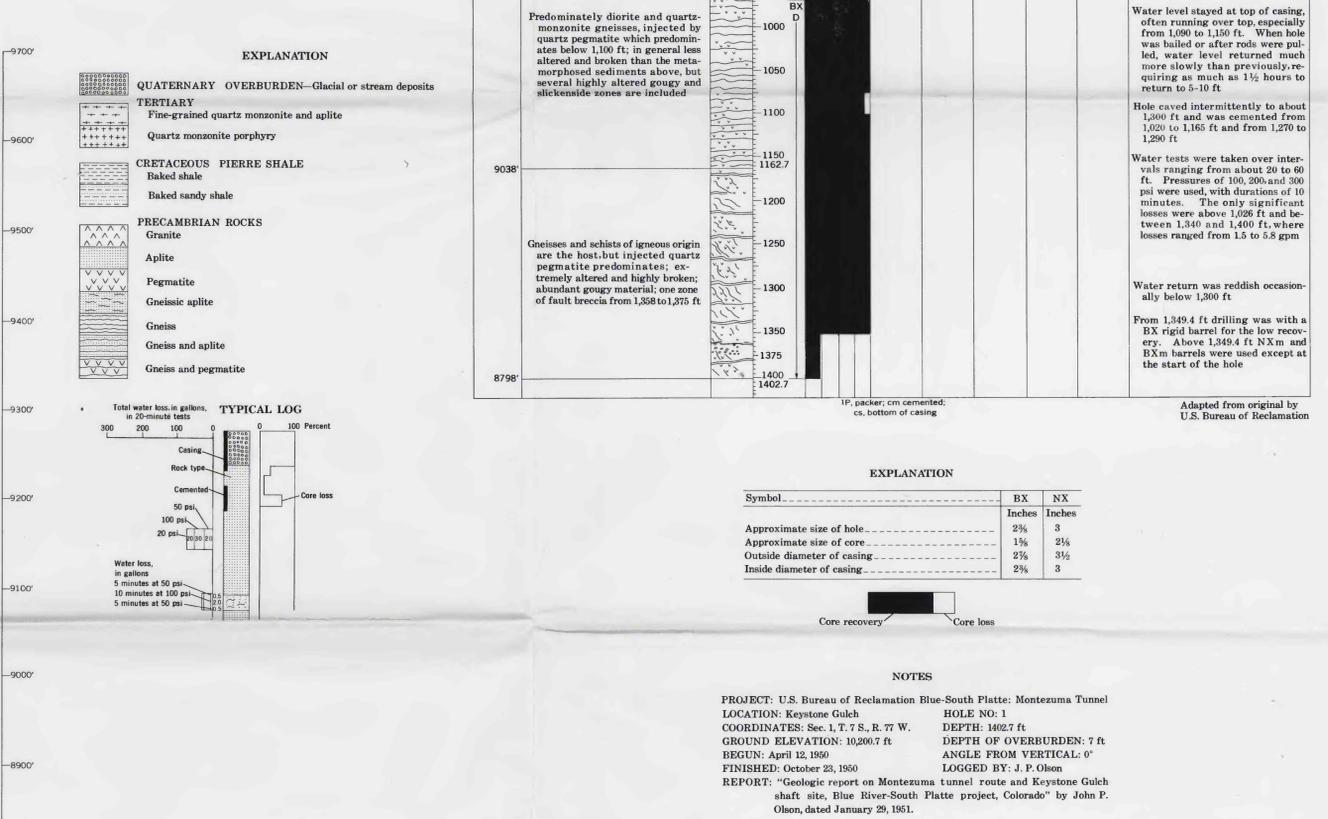
ELEVATION	CLASSIFICATION AND PHYSICAL CONDITION	LOG	DEPTH, TYPE, SIZE OF HOLE	CORE RECOVERY (percent)	PERCOLATION TEST			LENGTH OF TEST (minutes)	NOTES
					DEPTH (ft)	LOSS (gpm)	PRES-SURE (psi)		
10,200.7	Silt and muck (overburden)		NX	100					
10,193.7	Decomposed schist, granite, and gneiss; probably highly altered and clayey		50	0	90	No	Test		Water level stayed near or at top of casing, at times running over top. Hole was bailed twice, but water returned immediately to near top of casing.
10,110	Cordierite-biotite-sillimanite schist injected lit-par-lit by hard white quartz veins; little altered, with alteration becoming more pronounced with depth; pyrope garnet is often conspicuous; some slickensides apparent		90-100	90	140	Up to 4.2	50	5	First evidence of caving at 68 ft; hole caved intermittently thereafter, especially from about 330 to 370 ft.
9,988			200	140	200	0 or negligible	50	5	Water tests were taken over approximately 10-ft intervals from 90 to 427 ft.
			200	427	200	0 or negligible	100	5	Water tests were taken over approximately 10-ft intervals from 90 to 427 ft.
			427	427	500	No	Test		Casing program: 4 in. pipe, 0-87 ft NX casing, 0-380.4 ft BX casing, 0-969.9 ft
9,364	Gneiss and schist of sedimentary origin (biotite-sillimanite-cordierite schist, predominating); quartz injections numerous; alteration moderate to strong, in general becoming stronger with depth; numerous slickensides, gouge zones, and offset veinlets, especially below 330 ft		800						Water level stayed near or at top of casing, at times running over top. Hole was bailed frequently to about 25-35 ft and the water level always rose back within 20 minutes. There was no water return from 944 to 970 ft.
			836.7						Hole caved frequently and had to be cemented between 620 and 720 ft and between 755 and 915 ft.
			847.7						Water tests were taken from 730 to 1,000 ft over intervals ranging from 30 to 50 ft. Pressures of 100-200 psi were used with durations of 10 minutes. No significant loss was noted except in the tests taken below 856 ft, where 2-11 gpm loss was noted.
			850						Water return was reddish from 869 to 877 ft.
9,353	Sedimentary schist and igneous (hornblende diorite) gneiss; transition zone from metamorphosed sediments (Idaho Springs Formation) to metamorphosed igneous rocks (Swandyke Hornblende Gneiss); passed from one to the other several times		950						Water level stayed at top of casing, often running over top, especially from 1,090 to 1,150 ft. When hole was bailed or after rocks were pulled, water level returned much more slowly than previously, requiring as much as 1 1/2 hours to return to 5-10 ft.
			1,000						Hole caved intermittently to about 1,300 ft and was cemented from 1,020 to 1,165 ft and from 1,270 to 1,290 ft.
			1,050						Water tests were taken over intervals ranging from about 50 to 60 ft. Pressures of 100, 200, and 300 psi were used, with durations of 10 minutes. The only significant losses were above 1,026 ft and between 1,340 and 1,400 ft, where losses ranged from 1.5 to 5.8 gpm.
9,038	Predominately diorite and quartz-monzonite gneisses, injected by quartz pegmatite which predominates below 1,100 ft; in general less altered and broken than the metamorphosed sediments above, but several highly altered gougy and slickenside zones are included		1,100						Water return was reddish occasionally below 1,300 ft.
			1,150						From 1,349.4 ft drilling was with a BX rigid barrel for the low recovery. Above 1,349.4 ft NX and BXm barrels were used except at the start of the hole.
			1,162.7						
			1,200						
			1,250						
			1,300						
			1,350						
			1,375						
			1,400						
8,798	Gneisses and schists of igneous origin are the host, but injected quartz pegmatite predominates; extremely altered and highly broken; abundant gougy material; one zone of fault breccia from 1,358 to 1,375 ft		1,402.7						

Adapted from original by U.S. Bureau of Reclamation



C. ALONG PROPOSED ROBERTS TUNNEL LINE, 1955-56

Logged by E. E. Wahlstrom



B. AT PROPOSED SHAFT SITE, KEYSTONE GULCH-BLUE RIVER-SOUTH PLATTE DIVERSION TUNNEL

NOTES

PROJECT: U.S. Bureau of Reclamation Blue-South Platte: Montezuma Tunnel
 LOCATION: Keystone Gulch HOLE NO: 1
 COORDINATES: Sec. 1, T. 7 S., R. 77 W. DEPTH: 1402.7 ft
 GROUND ELEVATION: 10,200.7 ft DEPTH OF OVERBURDEN: 7 ft
 BEGUN: April 12, 1950 ANGLE FROM VERTICAL: 0°
 FINISHED: October 23, 1950 LOGGED BY: J. P. Olson
 REPORT: "Geologic report on Montezuma tunnel route and Keystone Gulch shaft site, Blue River-South Platte project, Colorado" by John P. Olson, dated January 29, 1951.

Symbol	EXPLANATION	
	BX	NX
Approximate size of hole	2 1/2	3
Approximate size of core	1 1/2	2 1/2
Outside diameter of casing	2 1/2	3 1/2
Inside diameter of casing	2 1/2	3