GEOLOGIC AND ROCK STRUCTURE LOG

COMPANY WH ENGINEERING - TOSCO

CORE HOLE DS1-C2 (MINE SITE 1)

LOCATION NG61958 E 1295266 (COLO STATE COORDINATES CENTRAL ZONE)
SE¼ SECT. 12 T.5.5S, R95W, 6PM — SOUTH SIDE TRAPPER CREEK

ELEVATION 7959.2 MSL

DATES DRILLED July 17-18, 1980

CONTRACTOR ARMSTRONG ENGINEERS

DRILLER BILL VAUGHN

RIG CME 55 — NX CORE

LOGGED BY W. HELEY / D. KEITHLEY

DATE SEPT 6 1980

MARKER BED DEPTH DATUM

FRACTURE—PARTING CLASSES

TYPE 1: FRESH BREAK
Drilling induced; clean, unweathered, irregular, rejoins with no visible separation.

TYPE 2: ROTATED BREAK
Shows grinding in core barrel; origin uncertain since surface features destroyed.

TYPE 3: CLEAN BREAK
Generally smooth, unweathered, unmineralized, surfaces do not rejoin as a Type 1; bedding plane or possible tight joint.

TYPE 4: NATURAL BREAK
Open discontinuity; weathered, slickensided, surfaces, pre-existing.

TYPE 5: HEALED BREAK
Obvious mineralized pre-existing recemented fracture.

FRACTURE SPACING

Very Wide 10'
Wide 3 - 10'
Moderate 1 - 3'
Close .15- 1'
Very Close .15'
R = Rubble

FRACTURE CHARACTER

p - polished, s - smooth, r - rough, v-very rough
k - slickensided

INFILLINGS

A - Clay
B - Carbonaceous
C - Clean
F - Oxidized
L - Leach or weathered
M - Marcasite (Pyrite)
N - Nahcolite
Q - Quartz
T - Talc
W - Calcite
U - Unidentified

ROCK QUALITY DESIGNATION(RQD)

1. Sum of Pieces .35' or longer ÷ run length
* 2. Sum of Pieces .35' or longer ÷ 10 feet

DEPTH (FT)	CORE: INTERVAL	CORE: RECOVERY	FRACTURES: FREQUENCY	FRACTURES: SPACING	FRACTURES: CLASS-INFILL-CHARACTER	FRACTURES: DIP	PARTINGS: CLASS-INFILLING	PARTINGS: DEPTH	PARTINGS: DIP	ROCK QUALITY DESIGNATION: PIECE LENGTH	ROCK QUALITY DESIGNATION: VERY POOR / POOR / FAIR / GOOD / EXCELLENT (10', PERCENT 25 50 75 90)	TESTS	LITHOLOGY	DESCRIPTION AND REMARKS
														HOLLOW AUGER TO 13 FEET
														NO CORE
10														
														TAN SILTSTONE
			3J4				CFALB	9B		.42				1' GREY BANDED MARLSTONE
			2J5								4			RUBBLE ZONE W/ CLAY INFILLING
							LFBAW	R						
20														
														TAN SILTSTONE
			1		FW		LAB	4						GREY BANDED MARLSTONE
			4J		FBW		FAB	8						TAN SILTSTONE
			2J	BFW				1		.59	30			LEACHED BROWN TUFF, LEACHED ZONE WITH CALCITE & GILSONITE INCLUSIONS
										.83				GREY BANDED MARLSTONE TO TAN
30			3J				A,F	5		.98				F.G. SANDSTONE, GREY MARLS, TUFF ZONE
			4J		F		L,F,B,A	8						LEACHED TAN MARLSTONE
			5J		A,F		A	4						TAN TO GREY MARLSTONE
			1J				FWB	R						TUFF BED, BROWN MARLSTONE, & RUBBLE ZONE
			3J		AFB		FB	2		1.50	45			TUFF BED, TAN TO GREY MARLSTONE
40			1J				FB	1		1.50				GREY TO TAN MARLSTONE
								2		1.46				LEACHED ZONE
								R						
			4J		LFB			2		.37				GREY MARLSTONE
			3J		LFBA			3		.60				TAN SANDSTONE, LEACHED
			2J		AWFB	70°, 85°		4		.85	34			GREY MARLSTONE W/ TUFF STRINGERS
50			3J		WF					.45				
										.55				
			2J			90°	FL	5		.62				
										.82				TAN F.G. SANDSTONE GREY MARLSTONE, TAN SANDSTONE
			2J			90°	WF	5		.95				
										.97				
							WLF	4		.47	77			MARLSTONE
			2J		WB	30°, 75°	WB	1		1.20				
60			2J		ABF	20°		R		.80				RUBBLE
								1		.34				
			2J		F	30° 90°	A	2		.63				
							FBL	2		1.19				GREY MARLSTONE
										.53				
			1J		LAF	85°		8		.74	40			
			3J		LF	80°		R						TAN MARLSTONE (RUBBLE ZONES)
								3		.98				
70			3J		LF	30°, 60°, 80°	FW	R						
								R						GREY MARLSTONE
			4J		WF	35° 70° 85° 60°	WBF	4		.88				
							F	R		.74	33			
								3						
			2J		WF	55° 65°				.50				TAN SANDSTONE
80			3J		WBF	45° 90° 25°	AF	3		.80				GREY MARLSTONE
										.36				TAN SANDSTONE
			1J			50°	WAF	3		.42				GREY MARLSTONE
										.40				
			1J		W	30°	F	9		.50				TAN SANDSTONE
										.40				GREY MARLSTONE, MOTTLED
			5J			25° 20° 20° 30° 30°	W,F	2		.53	37			
										.45				
			7J		F	45° 65° 60° 50° 90°	F	2						TAN SANDSTONE
90			5J		F	90° 60° 65° 90° 40°	FBW	4						
			2J		F		W	4		.40				GREY MARLSTONE
							F	R		.75				TUFF STRINGER
			3J		F	75°, 35°	F	1		.60	61			TAN SANDSTONE
										.45				
			1J			45	W	5		1.78				
100										.43				GREY MARLSTONE
			2J		WBF	90° 70°		2		.68				
										1.30				
			4J			75° 25° 60° 25°		3		.65				TUFF STRINGER TAN SILTSTONE
			1J		WF	40°		4		1.60	76			
										.39				
										.68				G. MARLSTONE W/ NAHCOLITE NODULES
110			4J		WBLF	65° 45° 15° 75°		2		1.50				
										.64				TUFF STRINGER NACHOLITE VUG
			5J		WBF	60° 30° 85° 55° 90°		5		.47				
			4J		WB	50° 40° 25° 30°	F	5						TAN MARLSTONE W/ NACHOLITE NODULES
			6J		AF	15° 25° 90° 90° 20°		1		.80	39			GREY MARLSTONE
			7J		AWF	70° 70° 40° 30° 60° 75° 55°		2		.87				TUFF STRINGERS
120			7J		AWF	65° 80° 70° 60° 60° 85° 90°		1		1.23				TAN SILTSTONE W/ HEALED FRACTURES
			2J		WF	80° 10°		5		.82				
			5J		AW	75° 25° 55° 90° 65°	WBA	6		.52				
										.37				
			1J		WF	40°	W	1		.65	34			GREY MARLSTONE
			6J		WFB	60° 30° 20° 40° 50° 30°		1		.66				
130			6J		WPL	45° 90° 20° 25° 40° 40°		2						TUFFSTRINGER
			3J		WF	70° 35° 65°		1		.49				
			2J		WF	60°		4		.69				GREY MARLSTONE W/ TUFF
			3J5		WL	60° 70° 10°		1		.78	63			
			1J5		WF	60° 90° 85°		4		1.20				LEACHED
			3J							1.45				
140			1J5		FB	10°	W	2		.55				TAN SILTSTONE
										.44				GREY MARLSTONE
			1J		AFW	90°	W	R		.65				TUFF STRINGER
								1						
								0		1.94				GREY SANDSTONE
			2J		F	50° 30°	F	2		.45	64			
			3J			50° 40° 90°	F	R		.66				LEACHED, CLAY INFILL TUFF BED
150								0		2.69				
								0						GREY MARLSTONE (OSH)
								0		4.00				TUFF STRINGERS
			4J			90° 80° 50° 90°		1			88			
								0		4.20				GREY MARLSTONE (OSH)
160										1.20				
							W,C	0		.12				TUFF STRINGER
							C	1		2.90				GREY MARLSTONE (OSH)
								0		1.35				
			1J		BW	90°		0		1.62				VERT. FRACT. W/ BIT. FILLING
170							W	1		.57	89			TUFF STRINGER
								0		1.33				GREY MARLSTONE (OSH)
							L	1		2.03				TUFF STRINGERS
											98			GREY MARLSTONE (OSH)
										7.75				GILSONITE STRINGERS
180														GREY MARLSTONE (OSH)
														TUFF STRINGER
										9.25				GREY MARLSTONE
											98			TUFF STRINGER
														GREY MARLSTONE
190							L	1		.60				TUFF STRINGER
			1J		C	30°	L	1						GREY MARLSTONE
										3.82				TUFF STRINGERS
											77			TUFF BED
										2.5				
200		198	3 TD											TD
210														