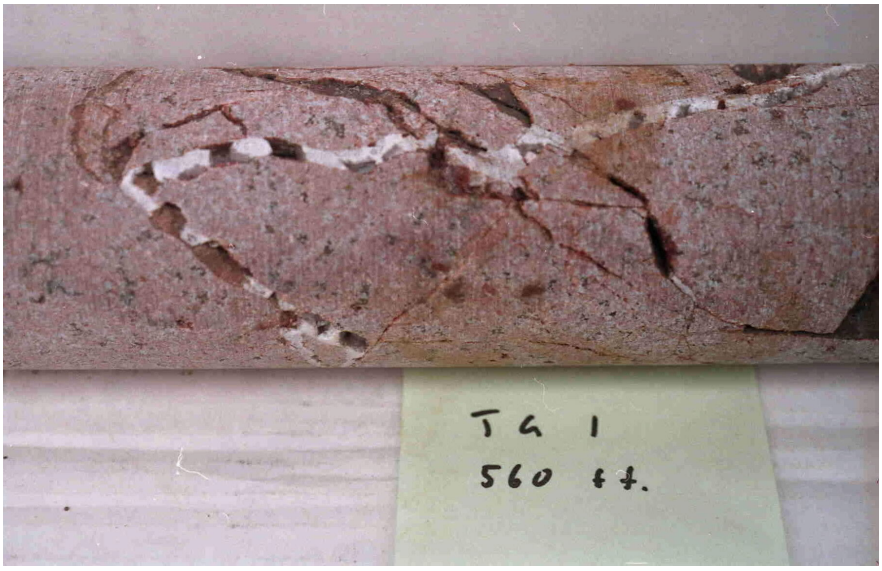
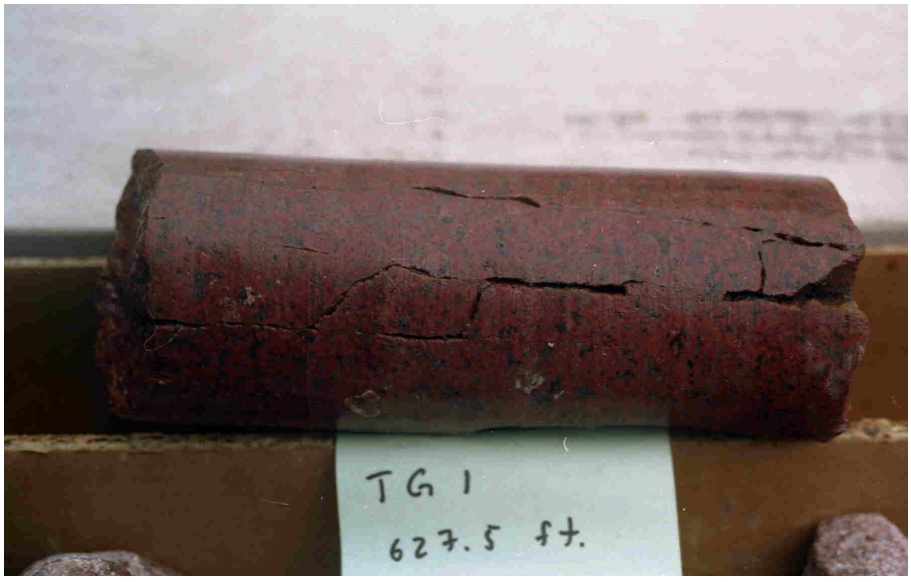

TG 1
560 ft.


TG 1
569 ft.

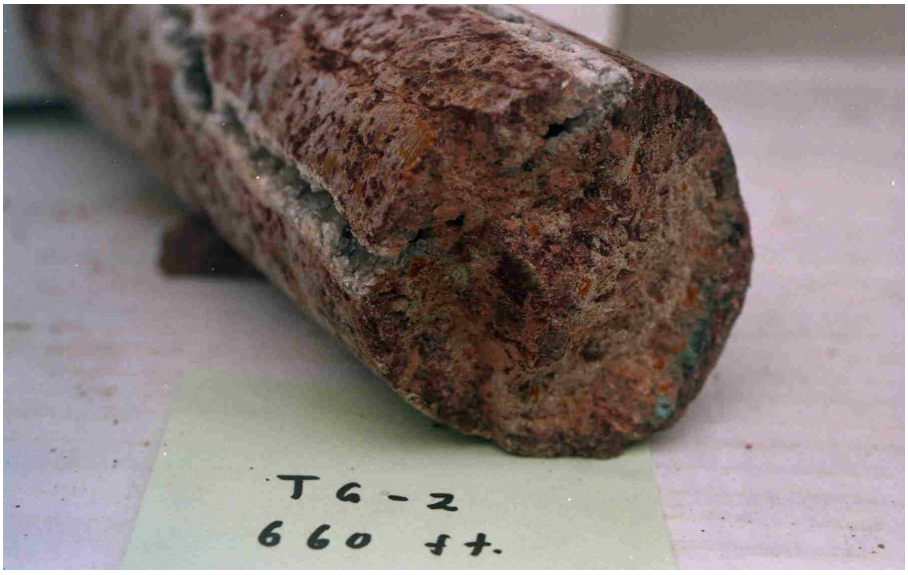

TG 1
580 ft.


TG 1
587 ft


TG 1
627.5 ft.


TG-2
618 ft.


TG-2


TG-2
660 ft.


TG-2
834 ft.

Notes and observations of Al Waibel.

APS Clifton, Arizona Notes on core and cuttings from Temp. Gradient Holes
TG-1 (Potter Ranch)
TG-2 (Casias Ranch)

TG-1 Potter Ranch The hole was drilled entirely within the PreCambrian granite.
Mapped as Xyg Granite, early or middle Proterozoic.

Rotary Drilling from surface to 555 ft.
Cuttings samples incomplete. Samples available:

45-50 ft.
55-60 ft.
75-80 ft.
95-100 ft.
105-110 ft.
125-130 ft.
145-150 ft.
155-160 ft.
165-170 ft.
175-180 ft.
185-190 ft.
210-220 ft.
225-230 ft.
235-240 ft.
245-250 ft.
255-260 ft.
265-270 ft.
285-290 ft.
295-300 ft.
315-320 ft.
345-350 ft.
365-370 ft.
395-400 ft.
445-450 ft.
515-520 ft.

Dark red coarse-grained k-spar, albite granite with lesser biotite, mapped on the surface as early to middle Proterozoic granite XYg. White soft fault gouge-like material is observed as minor components in most of the samples. In a few samples, such as the 515-520 ft., this soft white material makes up about 5% of the sample volume. No calcite is observed within the soft white material. There is an association of hydrous Fe oxides in some of these white fragments.

core 555-637 ft.

Box 1 555-563 ft.

Dark red coarse-grained k-spar, albite granite with lesser biotite, mapped on the surface as early to middle Proterozoic granite XYg. An older set of fractures contain Fe and Mn oxide gangue minerals. These fractures are cut by younger fractures, 6 to 8 mm wide, containing coarse-crystalline calcite. (See photo, TG-1, 560 ft.) No other alteration or precipitation minerals are observed in association within the fractures containing these larger calcite crystals.

Box 2 563-569.5 ft.
Dark red granite with fractures. The fractures range from open to partially sealed with both silica and oxidized gangue minerals. The fractures are typically high-angle, and locally contain brecciated fragments (photo at 569.5 ft.).

Box 3 569.5-578 ft.
Dark red granite (XYg), highly fractured with some fractures containing both silica and oxidized gangue minerals. , These fractures are commonly less than 5 mm wide,

Box 4 578-586.75 ft.
XYg granite as above. Fractures are commonly high-angle and often are partially filled with silica and brown to rust to black oxides of Fe and some Mn. Locally the oxides show relict boxwork structure. Photo at 580 ft. shows fracture face with oxidized fracture-filling minerals.

Box 5 578-609 ft. No recovery from 587 to 597 ft.
XYg granite as above. The recovered core shows open fractures with no precipitation or alteration minerals, cutting earlier fractures containing limonite and minor pyrolucite.

Box 6 609-618 ft.
XYg granite as above. Open fractures are observed with no vein-filling minerals. Older fractures, typically 1-4 mm wide, contain limonite and minor pyrolucite. Locally older fractures contain thin green to light gray waxy coatings, possibly clay.

Box 7 618-626.5 ft.
XYg granite as above.

Box 8 626.5-637 ft. TD
XYg granite as above. Older generation of fractures, typically 1-4 mm wide, are dominated by lymonite and other hydrous Fe oxides. Many also contain thin green to gray waxy clay-like coatings. A younger set of vertical fractures are open, with no vein-filling minerals (photo at 627.5 ft.).

Notes and observations of Al Waibel.

TG-2 Casias Ranch

cuttings	0-325 ft.
core	325-1000 ft.

Rotary Drilling from surface to 325 ft.
Cuttings samples incomplete. Samples available:

26-30 ft.	75-80 ft.
36-40 ft.	85-90 ft.
45-50 ft.	95-100 ft.
55-60 ft.	105-110 ft.
65-70 ft.	115-120 ft.

26-50 ft	calcarious arenite Longfellow Fm.
50-120 ft.	purple calcareous Coronado Quartzite

Note, the Cc quartzite thickness here appears to be 420 ft. thick, slightly thicker than te published maximum thickness of 120 m.

Box 1 325-337 ft.
Box 2 337-347 ft.
Box 3 347-357 ft.

Brown to gray quartzite intercalated with arkose. Brecciated sections are common, i.e. @ 332-340 ft. Breccia shows quartzite fragments juxtaposed to arkose. Cementing of breccia is poor. Fractures in the quartzite occasionally show Mn oxide & Fe oxides coatings. Occasional 2-3 mm wide fractures contain irregular silica cementing and oxidized Fe minerals, possibly after minor sulfide minerals.

354.8-257 ft. Rock is strongly lithified. Argillaceous portions are very strongly lithified, and contain plastically deformed lithic fragments

Box 4 357-368 ft.
Box 5 368-377.3
Box 6 377.3-387 ft.
Box 7 387-396.5 ft.

Quartzite and arkose with lose uncemented breccia zone. These breccia areas often contain a brown fine matrix with variably disseminated hydrous Fe oxide minerals. Locally the matrix may contain kaolinite. Orange to pink portions of the matrix contain disseminated

hematite. High angle to near vertical fractures within the more solid core are typically about 1 mm wide, and locally contain micro-quartz and hydrous Fe mineral stains. Occasionally micro-boxwork texture is observed in these fractures.

Box 8 396.5-406 ft.
Box 9 406-415.8 ft.
Box 10 415.8-425.1 ft.
Intercalated quartzite and arkose as above, locally brecciated as above.

Box 11 425.1-434.5 ft.

425.1-430.5 ft. Broken uncemented core fragments ranging in size from 1 cm to 15 cm. No cementing is observed. The brecciated zone includes fragments of older breccia. At 430 ft. are older brecciated fragments with a dark brown to charcoal cement of oxidized boxwork gangue.

Box 12 434.5-444.5 ft.
Box 13 444.5-455 ft.
Box 14 455-467.5 ft.
Box 15 467.5-476.5 ft.
Intercalated quartzite and arkose as above, locally brecciated as above. Moderate increase in hematite below 434 ft.

469 ft. Base of the intercalated quartzite and arkose.
469-470 ft. Red silt and arenite with weathered red grante fragments.
470-477 ft. Reddish weathered granite with variable sized fragments, with uncemented breccia between 474-479.5 ft.
479.5 ft. and below Dark red coarse-grained k-spar, albite granite with lesser biotite, variably brecciated, typically uncemented. Larger core fragments show fractures from about 60° to near vertical. Slickensides on some fracture faces show near-vertical striations. Some fracture faces show Fe and Mn oxide coatings.

NB 3 to 6 mm wide open fractures with coarse calcite crystals precipitated within the fractures. Observed @ 441.5, 447-448, 449 and 465 ft. No other precipitation minerals observed and no alteration minerals observed on fracture faces. This set of fractures with calcite crystals appear to be the most recent fracture and mineral event observed within this section of core.

Box 15 - Box 24
Reddish granite (XYg) as above

Box 25
XYg granite as above. 6 mm wide fracture at 565 ft. shows druze calcite crystals partially filling the fracture. No other precipitation minerals and no alteration minerals are observed

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associated with the druze calcite. Other fracture faces show coatings of hydrous Fe oxides and a soft light gray to green-gray clay-like material.. Photos

Box 27 578-588 ft.
Box 28 588-597.5 ft.
Box 29 597.5-605 ft.
Box 30 605-614 ft.

XYg granite as above. Dominant fracture angles range between about 45 to 70°. White fine crystalline calcite in .5 to 2 mm wide fractures is common. Fracture faces also have coatings of black to green to yellow hydrous Fe oxides.

608-609 ft. Reddish cryptocrystalline aplite zone in granite. This aplite zone appears to be late-stage cooling of the granite rather than a post-cooling vein. Portions of the boundaries are sharp, while other boundaries show phenocryst clusters floating in the silica.

Box 31 614-623.5 ft.
Box 32 623.5-633.5 ft.
Box 33 63.5-644.5 ft.
Box 34 644.5-652 ft.

XYg granite as above. Continued 1-3 mm wide fractures filled with white fine-crystalline calcite.

631-638 ft. Brecciated, uncemented granite, strongly Fe-oxidised similar in appearance to strong surface weathering (photo).

640.5-646 ft. Reddish aplite zone with a few later fractures and vug sites containing dark brownish gangue-like oxides.

Box 35 652-660.5 ft.
Box 36 660.5-670 ft.
Box 37 670-679.5 ft.

XYg granite as above, tho down to 661 ft. it is highly oxidized and leached, similar in appearance to surface weathering, tho likely due to supergene alteration.

661-686 ft. The granite is more competent and less altered than above, with 1-3 mm veinlets of white fine-crystalline calcite.

686-690 ft. Reddish aplite.

693.5-718 ft. XYg granite, strongly brecciated, locally with abundant very fine fault gouge. The breccia is uncemented and unlithified. Fe minerals are strongly oxidized. No secondary calcite is observed. Local white clay is observed.

718-730 ft. XYg granite, more competent and less altered than above, with 1-3 mm veinlets of white fine-crystalline calcite.

730 ft. & below Brecciated granite, ranging from 15 cm long fragments to very fine fault gouge. No precipitation minerals are observed.

764-771 ft. Variably brecciated granite, with no cementing. Portions of this zone show an early episode of brecciation, completely lithified, and brecciated a second time. Portions of the fragments show dark brown to charcoal oxidized boxwork gangue. 1-3 mm veinlets of fine crystalline calcite are observed, predating the last episode

	of brecciation.
778-782 ft.	Fault gouge within XYg. Slickensides indicate vertical to 20° oblique movement.
To 834 ft.	XYg granite as above.
834-860 ft.	Dark green-gray fine-crystalline mafic subvolcanic sill, possibly related to Td of the geologic map. No phenocrysts are observed. The rock appears to be basaltic. Red sub-mm hematite alteration is common. Veins of fine-crystalline calcite are observed continuing from the granite into the sill. Fracture faces are commonly contain a thin coating of calcite.
860-870 ft.	XYg granite, dominated by reddish cryptocrystalline silica.
870 ft.	At 70° angle, fault boundary with brown fault gouge in contact with reddish aplite aspect of Xyg.
870-877 ft.	Fault gouge derived from XYg granite.
877-879 ft.	Fault gouge derived from mafic sill.
879-883 ft.	Brecciated mafic sill. Fragments are uncemented. Slickensides on larger fragments indicate near vertical movement.
883-932.5 ft.	Broken to variably brecciated Xyg. Occasional thin veins of white fine-crystalline calcite are observed.
932.5-1000 ft.	XYg dark red coarse-grained k-spar, albite, biotite granite, locally containing fractures. Some fracture faces are coated with hydrous Fe oxides ranging from black to dark rust. Occasional thin veins of white fine-crystalline calcite are present throughout.

Photos:

TG-1

560 ft. Coarse Calcite crystals in XYg granite. Fractures containing coarse-crystalline calcite contains

569 ft. High-angle fracture in granite, with minor brecciation. The fracture filling is predominantly oxidized gangue minerals, minor silica and minor very fine fault gouge.

580 ft. Hydrous Fe minerals and minor Mn oxide with micro-boxwork structure on fracture face in XYg granite.

587 ft. Fractured granite showing oxidyzed fracture-filling minerals. Local minor secondary kaolinite is also observed.

627.5 ft. Relatively unaltered XYg granite displaying open vertical fractures.

TG-2

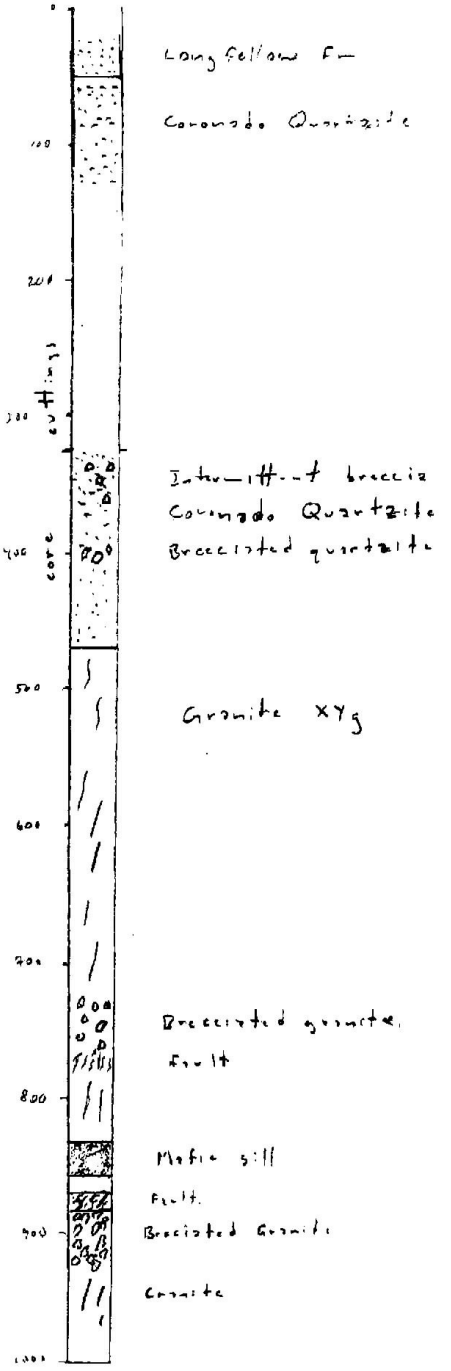
618 ft. View of fresh granite.

634 ft. Strongly oxidized granite. Hydrous Fe-oxides dominate the color of the rock. Alteration minerals suggests leaching with a cool low pH fluid.. Note Oblique slickenside striations on fracture face, coated with a thin layer of soft white to blue-green clay-like material.

660 ft. Strongly oxidized granite with a late-stage druze calcite-bearing fracture. Note minor Cu carbonate at lower right.

834 ft. Upper contact between Xyg granite and mafic sill. Note thin white vein of fine-crystalline calcite extending from the granite into the mafic sill. Also note the brown Fe oxidation of femic minerals adjacent to the calcite vein in the sill.

TG-2 Cross Ranch



TG-1 Potter Ranch