DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

KINGDOM OF SAUDI ARABIA
MINISTRY OF PETROLEUM AND MINERAL RESOURCES

UNITED STATES GEOLOGICAL SURVEY
OPEN-FILE REPORT 81-561

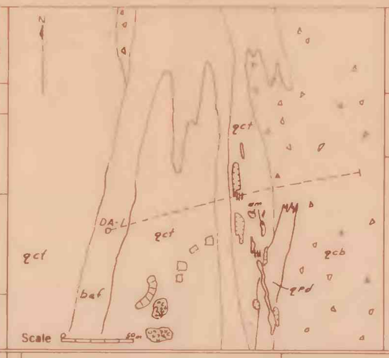
TECHNICAL RECORD 5
SA(IR) - 343
PLATE 2

DETAILED LOGS OF DIAMOND DRILL HOLES DA–1, DA–2, AND DA–3

DA-1

KINGDOM OF SAUDI ARABIA
Ministry of Petroleum and Mineral Resources
Directorate General of Mineral Resources

Organization: U.S. GEOLOGICAL SURVEY
Mineral Occurrence: EAST DHAHAR
Drill Hole Number: DA-1
References:
Logged by: CHARLES W. SMITH



Date Started: NOV. 5, 1977 — Hole Size: Nx 0-60.35; Bx 60.35-227.20
Date Completed: [illegible]
Driller: ADC

Survey Data
Collar Coord: Lat 18°13′25″ N — Long 43°44′30″ E
Grid Reference: GREENWICH — Elevation 1907m

Subsurface (Tropari or)

Depth	Inclination	Azimuth
[illegible]	42°	[illegible]
[illegible]	40°	72°
150	36°	74°
225	30°	76°

Column headings: CORE RECOVERY (LENGTH (m), #) · CORE BOX · STRUCTURE (including water loss and cementation) · INTERSECTION ANGLE WITH CORE AXIS · LOG SCALE 1:200 · LENGTH (m) · LITHOLOGY · MINERALIZATION · SAMPLE DATA (LENGTH (m), INTERVAL (m), SAMPLE NUMBER, ANALYSES: Au g/t, Ag g/t, Cu %, Pb %, Zn %) · AVERAGES

Structure:
- Foliation 55° to core
- Contact
- Foliation 60° to core; contact
- Irregular patches and stringers of milky quartz
- Milky quartz
- Foliation 55° to core
- Irregular quartz stringers
- Milky quartz 10 cm wide; rock weakly foliated
- Foliation 60° to core
- Foliation very weak
- Silicic bands and patches - some cross-cutting foliation
- Foliation 70° to core
- Milky quartz - 20 cm wide
- Foliation 60° to core
- Very tight folding
- Faulted contact
- Contact
- Foliation 75° to core
- Milky quartz
- Foliation 70° to core
- Milky quartz stringers
- Contact
- Foliation 90° to core
- Contact

Lithology:
- 2.50 — Ferruginous mud
- 5.00 — Andesite? Fine grained, compact, gray-green.
- 15.00 — Metadiabase? Dike, fine grained, gray to black.
- Andesite? Dark gray-brown, mottled, amygdaloidal 14.75 to 15.75.
- 18.80 — Quartz crystal tuff with bands of more silicious material parallel to folia.
- 34.00 — Cherty layers to 1 cm thickness - parallel to foliation.
- 37.00 — Quartz crystal tuff, gray-green; quartz crystals elongated.
- 49.00 — Quartz crystal tuff, very fine grained.
- Quartz crystal tuff, [illegible], few quartz crystals.
- 97.00 — Moderate [illegible] alteration.
- Talc, white. Abrupt change of rock type.
- 118.00 — Quartz crystal tuff, light gray. Quartz-sericite alteration, intense.
- 184.20 — Quartz crystal pyroclastic breccia
- Quartz crystal tuff - dark-gray-green
- 227.20 — End of hole

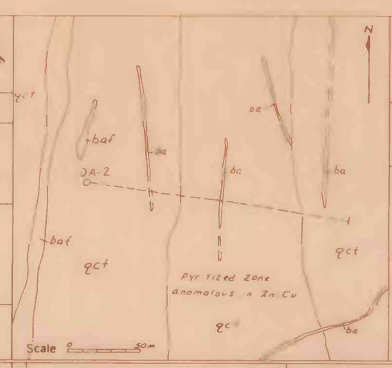
Mineralization:
- Thin wisps limonite (after pyrite?) parallel to foliation.
- Bottom of oxidized zone at 18.80.
- Pyrite, cubic and banded < 1% of core.
- Chalcopyrite, very sparse, rimming quartz and as thin wisps parallel to folia.
- Pyrite, pyrrhotite with very sparse chalcopyrite - finely disseminated.
- Silicified layer, 10 cm wide with abundant pyrite.
- Pyrrhotite? with chalcopyrite?, very finely disseminated.
- Pyrite, finely disseminated along foliation ~ 1% of core.
- Chalcopyrite, very sparse - associated with silicic bands and patches.
- Pyrite with pyrrhotite and very sparse chalcopyrite along foliation ~ 2-3% of core.
- Sulfides ~ 2% of core - some in thin fractures not parallel to folia.
- Sulfides decrease to < 0.5% of core.
- Sulfides increase to ~ 0.5% of core.
- Pyrite heavily concentrated - 20 cm.
- Pyrite, cubic with sparse chalcopyrite, disseminated.
- Sphalerite with chalcopyrite. Bands 1-10 cm wide - 99.60-101.00.
- Pyrite with minor chalcopyrite and sphalerite in narrow streaks and wisps.
- Pyrite [illegible] to near 2860 [illegible].
- Sphalerite, light brown, with cubic pyrite and minor chalcopyrite in thin bands - 118.00 to 122.10.
- Pyrite with sphalerite and chalcopyrite, nearly massive 45 cm at 122.10 m.
- Pyrite with chalcopyrite and sphalerite, banded and disseminated, 1-2% of core.
- Mainly cubic pyrite, variably banded and disseminated.
- Nearly free of sulfides.
- Dark bands very fine sulfides, sphalerite? 172.40 - 173.60.
- Nearly free of sulfides.
- Sulfide content very low
- No sulfides

Averages: 4.94, 1.49, 0.115, 4.17 [partly illegible]

DA-2

KINGDOM OF SAUDI ARABIA
Ministry of Petroleum and Mineral Resources
Directorate General of Mineral Resources

Organization: U.S. GEOLOGICAL SURVEY
Mineral Occurrence: WEST DHAHAR
Drill Hole Number: DA-2
References:
Logged by: CHARLES W. SMITH



Date Started: [illegible] — Hole Size: Nx 0-61.0; Bx 61.0-216.30
Date Completed: JAN. 5, 1978
Driller: ADC

Survey Data
Collar Coord: Lat 8°13′25″ N — Long 43°44′15″ E
Grid Reference: GREENWICH — Elevation

Subsurface (Tropari or)

Depth	Inclination	Azimuth
[illegible]	-38°	[illegible]
150.00	-32°	75°
[illegible]	-26°	[illegible]

Structure:
- Laminations 65°
- Contact; contact
- Quartz stringers
- Quartz stringers
- Banding foliation 70° to core.
- Quartz vein with ptygmatic folding.
- Contact; contact
- Foliation 75°
- Foliation, banding 85°
- Quartz vein
- Core ground off
- Contact; contact
- Quartz [illegible] 30 cm.
- Foliation banding 85°

Lithology:
- Banded tuff, light gray-green, with laminations 2-3 mm wide. Few quartz crystals 3 mm in diameter.
- 22.50 — Banded tuff, medium green, few quartz crystals.
- Banded tuff with irregularly spaced white, siliceous bands.
- 33.20 — Metadiabase dike, dark gray to black.
- Banded tuff with quartz crystals
- Chloritic alteration intense
- 103.70 — Andesite?, black to dark green grading into massive, dark gray rock containing porphyroblastic amphibole.
- 109.00 — Quartz crystal tuff, banded
- 126.00 — Quartz - quartz sericite alteration comes in stronger
- 154.00 — Metadiabase dike, dark gray, massive.
- 156.00 — Quartz crystal tuff, banded.
- 159.00 — Quartz crystal tuff very fine grained.
- 162.00 — Pumice fragments - 20 cm.
- 163.00 — Quartz crystal tuff, banded.
- 169.00 — Tuff with mottled texture, layers of pumiceous rock at varied intervals.
- 176.50 — Quartz crystal tuff, banded.
- Quartz crystal tuff banded
- 216.30 — End of hole 216.30

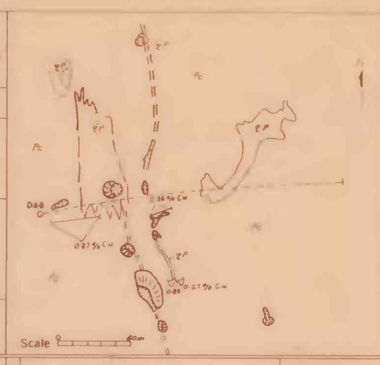
Mineralization:
- No sulfides
- 19.00 — Limonite in 2-3 mm bands
- No sulfides
- 33.20 — Limonite (after FeS_2?) in thin bands - some cross cutting foliation (10 cm).
- Bottom of oxidized zone
- 42.20 — Pyrite, cubic, associated with quartz stringers.
- 64.00 — Pyrite, very finely disseminated
- Pyrite increases in content to approximately 0.5%
- Blue to black, very fine grained mineral some of which rims, coats, and cross-cuts pyrite.
- Pyrite, disseminated and in fractures not parallel foliation.
- Pyrite ranging from very fine to coarsely crystalline. Chalcopyrite sparse as intergrowths with pyrite, rimming pyrite and as solitary wisps. Dark fine grained mineral replaces pyrite.
- Chalcopyrite, sphalerite concentrated in 10 cm band.
- Chalcopyrite, concentrated in 5 cm band.
- Chalcopyrite, sphalerite in 5 cm band.
- Chalcopyrite, sphalerite sparsely disseminated and banded.
- Sulfide content drops to < 0.5%
- No sulfides

Averages: 12m, Tr, 1.4, 0.05, Tr, 0.82 · 0.32 Zn · 15m, Tr, 6.6, 0.08, Tr, 0.528

DA-3

KINGDOM OF SAUDI ARABIA
Ministry of Petroleum and Mineral Resources
Directorate General of Mineral Resources

Organization: U.S. GEOLOGICAL SURVEY
Mineral Occurrence: AL HAJRAH
Drill Hole Number: DA-3
References:
Logged by: CHARLES W. SMITH



Date Started: JAN. 19, 1978 — Hole Size: Nx 0-51.40; Bx 51.40-250.00
Date Completed: FEB. 25, 1978
Driller: ADC

Survey Data
Collar Coord: Lat 18°[illegible]00″ N — Long 43°43′08″ (APPROX.)
Grid Reference: GREENWICH — Elevation 2010m

Subsurface (Tropari or)

Depth	Inclination	Azimuth
33 m	-4[illegible]°	82°
100 m	-35°	84°
150 m	-31°	86°
200 m	-27°	8[illegible]°
250 m	-23°	89°

Structure:
- Ferruginous mud and gravel.
- Foliation, layering 60° to core.
- Pumice fragments flattened and elongated parallel to foliation
- Fault
- Core broken
- Core lost
- Contact
- [illegible] of oxidized zone
- Folded quartz stringers
- Foliation - 70°
- Contact
- Numerous quartz stringers.
- Foliation - 85°
- Contact
- Contact
- Contact
- Contact; layering foliation 80°
- Foliation - layering 85°
- Contact; contact
- Contact; contact

Lithology:
- 2.00 — Pyroclastic breccia, light gray-green with light gray fragments (pumice?) - strong sericitic alteration.
- 29.00 — Quartz porphyry intrusive, blue quartz phenocrysts to 5 mm diameter. Strong quartz-sericite alteration.
- 75.10 — Pyroclastic breccia with much epidote
- 83.20 — Pumice fragments flattened parallel to foliation
- 98.00 — Rock changes from highly epidotized to moderately siliceous.
- 108.00 — Quartz porphyry intrusive, much quartz sericite.
- 143.00 — Pyroclastic breccia, pumiceous, with much epidote.
- 148.20 — Quartz porphyry intrusive, quartz-sericite
- Chlorite in local zones.
- 175.60 — Pyroclastic breccia, pumiceous, much epidote.
- 210.00 — Pyroclastic breccia, roughly layered, gray, fine grained with light gray bands.
- 222.00 — Quartz porphyry intrusive.
- 222.85 — Tuff? Gray green, dense showing faint layering.
- 229.55 — Quartz porphyry intrusive.
- 231.40 — Tuff?, gray-green, dense.
- Rock changes to dark gray with white, spotted texture.
- 250.00 — End of hole

Mineralization:
- Leached cavities, 20% of rock - cavities lined with calcite, epidote, silica, brownish-black limonite with rare chrysocolla, malachite and copper pitch.
- Limonite, massive, red-brown, 1 m changes to limonite with clay gouge. Other limonitic bands, 10 cm at 20.50, 5 cm at 21.80, 20 cm at 22.30.
- Partially oxidized with limonite rims surround[ing] pyrite and chalcopyrite cores.
- Pyrite, nearly massive, 20 cm at 30.25 and 30.75.
- Pyrite and chalcopyrite partially oxidized and leached - in stockworks and disseminated.
- Pyrite 10 cm at 51.50
- Chalcopyrite, finely disseminated and as stockwork stringers associated with varying amounts of pyrite.
- Chalcopyrite content drops off markedly.
- Chalcopyrite in narrow bands.
- Limonite in thin stringers.
- Covellite? with associated chalcopyrite.
- Chalcopyrite associated with local zones of dark green to black chlorite.
- Chalcopyrite concentrated in thin veinlets - 10 cm at 120.20.
- Chalcopyrite, in stringers and disseminated, very sparse.
- Pyrite, banded, at contact, chalcopyrite concentrated in thin stringer - 30 cm at 144.40.
- Chalcopyrite with pyrite finely disseminated and in stock works, gradually increases toward contact.
- Chalcopyrite with covellite (sparse).
- Covellite with dark brown limonite [illegible].
- Chalcopyrite with covellite in stringers 10 cm.
- Pyrite and chalcopyrite, sparsely scattered at 215.90.
- Pyrite, abundant.
- Chalcopyrite in tiny wisps, 1 to 2% of rock.
- Pyrite, 2% of rock

Averages: 13m, Tr, 5.43, 0.28, Tr, Tr · 11m, Tr, 2.78, 0.247, Tr, Tr · 18m, Tr, 2.18, 0.416, Tr, Tr · 5m, Tr, 1.6, 0.205, Tr, Tr · 20m, Tr, 2.6, 0.22, Tr, Tr · 20m, Tr, 1.5, 0.23, Tr, Tr · 11m, Tr, 1.16, 0.185, Tr, Tr

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards.