I W(500)

وزارة الداخليـــة
مصلحة المساحة الجيولوجية الامريكية
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

المملكة العربية السعودية
وزارة البترول والثروة المعدنية
KINGDOM OF SAUDI ARABIA
MINISTRY OF PETROLEUM AND MINERAL RESOURCES

أبحاث جيولوجية مختلفة
خريطة رقم ٢٠٢ A - I
MISCELLANEOUS GEOLOGIC INVESTIGATIONS
MAP I-202 A

التفسير الجيولوجي
GEOLOGIC EXPLANATION

Symbols queried where identification doubtful

QUATERNARY

Qes — Eolian sand
See legend for description of sand terrain types

Qs, Qg, Qu — Silt and gravel
Silt and associated fine sediments including caliche-like and gypsiferous deposits in undrained depressions, Qs; lag and other gravels of local origin, commonly the lag from originally extensive gravel sheets and trains, Qg; unconsolidated surficial deposits of silt, sand, and gravel may include unrecognized equivalents of other units of Quaternary age, Qu

Qg_2 — Gravel
Quartz gravel as sheets and trains with varying proportions of limestone and basement-complex pebbles; probably for the most part near its original relative elevation, Qg_2, shown as $\frac{Qg_2}{Tsm}$ in eastern and northwestern parts of map where it discontinuously overlies Tsm. The Aş Şahn gravel plain in northwestern part of map includes basalt pebbles probably derived from the 'Āmūd lavas in the Jawf-Sakākah and Wādī as Sirḩān quadrangles, and fairly abundant chert; may, in part, be of Tsm age

Qdc — Calcareous duricrust
Discontinuous mantle of red, brown, gray, tan, and yellow, usually hard, sandy limestone; commonly contains imbedded fragments of underlying rocks; varies in thickness from a few centimeters to 3 or 4 meters. Coarse frosted quartz sand grains are usually present, also a few fresh water mollusks. In many places the resistant duricrust carapace masks underlying rocks and, where extensive, hides underlying structure. Other occurrences: Qdc_1, smooth surfaces of duricrust gravel; Qdc_2, smooth surfaces of Qdc_1 mixed with other limestone, chert, and basement-complex gravel. Relict, dendritic pattern (see map legend) in the Al Hadhālil area and northwest consists of elevated drainage and tributary channels capped by resistant, varying thickness of duricrust separated by numerous, small, low, closed, interchannel siltfloored deflation hollows. The remnant duricrust-capped ridges occur predominantly on Umm er Radhuma formation rocks; northwestward, to a lesser extent, on Aruma formation rocks

TERTIARY

Tsm (ch) — Sandstone, marl, and limestone (Miocene and Pliocene)
Red, brown, and gray marly to calcareous sandstone, sandy marl with minor red sandy shale, siltstone and claystone, and sandy limestone; undifferentiated lateral equivalents of the Hofuf, Dam, and Hadrukh formations of the Northern Tuwayq and Western Persian Gulf quadrangles. Individual beds are in part lenticular and discontinuous over wide areas; quartz conglomerate or sandstone usually occurs at base. In eastern part of map Tsm is discontinuously overlain by duricrust, $\frac{Qdc}{Tsm}$; in places, not mapped, Tsm is partially masked by Aş Şaḩn-type gravel, Qg_2. South of Az Zafiri, Tsm discontinuously overlies Umm er Radhuma formation, $\frac{Tsm}{Tu}$. Chert concentrations, ch, in northern part of map

Tu (ch, sr) — Umm er Radhuma formation (Paleocene and Eocene)
Cream, tan, and gray limestone and fossiliferous limestone, dolomitic limestone, and dolomite; dark gray to black chert zones at many levels; local, thin calcarenitic and siliceous beds, and fairly common, coarse, yellow calcite crystals. Chert concentrations, ch, in northern part of map; smaller occurrences not shown; partially silicified ridges, sr, on western part of map; smaller occurrences not shown

CRETACEOUS

Ka (sr) — Aruma formation (Upper Cretaceous)
Light-gray, tan and buff, locally fossiliferous limestone with interbedded marly limestone and marly dolomite; chalky limestone, dolomitic marl, and yellowish-brown shale in upper part. Siliceous beds and calcite-quartz geodal zones locally at several levels; prominent coral zone in upper part. Chert concentrations, ch, in northern part of map; smaller occurrences not shown. Partially silicified ridges, sr, on western part of map; smaller occurrences not shown. Of Campanian(?) and Maestrichtian age

Kw — Wasi'a formation
Gray, white, and brown, commonly purple stained, crossbedded sandstone with dispersed quartz pebbles; abundant ironstone pellets and concretions at several levels; blue-gray, and yellow silty-sandy shale interbedded in upper part. A distinctive marine golden-tan limestone and dolomite unit of Campanian age wedges out southeast of Darb Zubaydah

JURASSIC

Jm — Marrat formation (Lower Jurassic)
Golden-brown to tan limestone and tan to brown sandstone

TRIASSIC OR JURASSIC

JTrm — Minjur sandstone
Light-gray, white, reddish-brown, yellow and purple stained sandstone with thin interbedded siltstone, shale, and yellowish-brown to reddish-brown sandy limestone

TRIASSIC

Trj — Jilh formation
Cream to tan oolite and impure limestone with minor red to gray friable sandstone interbedded with silty shale

PERMIAN

Pk — Khuff formation
Gray and cream limestone, cream oolite, and red crystalline limestone; identification doubtful due to masking by surficial cover

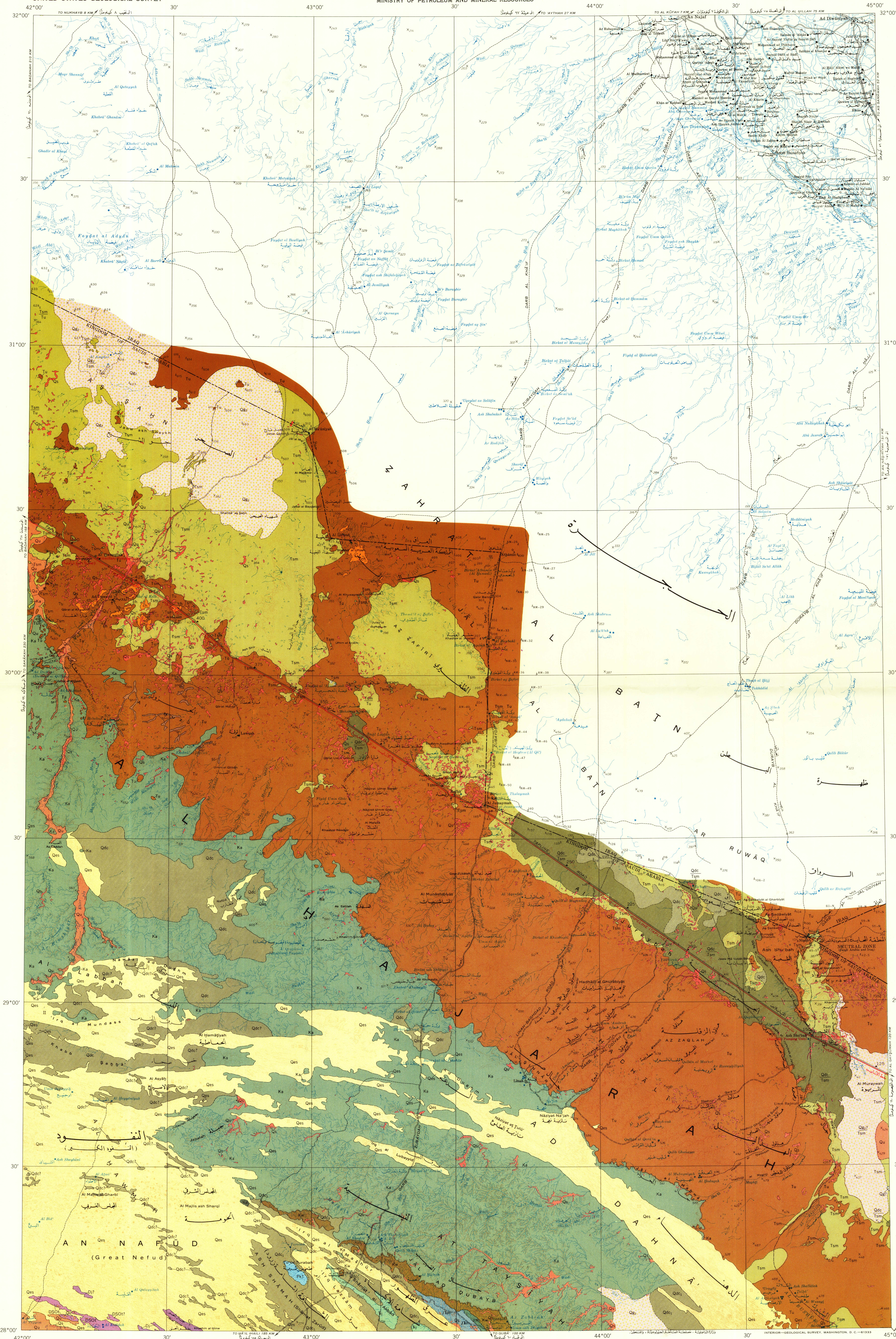
DEVONIAN

Dj — Jauf formation
White to yellow stained crossbedded sandstone thinly capped by gray-brown and reddish-brown sandy, fossiliferous limestone: locally oolitic

ORDOVICIAN SILURIAN AND DEVONIAN

DSOt — Tabuk formation
Gray, brown, and varicolored, locally crossbedded, slightly gypsiferous sandstone interbedded with gray, greenish-gray, and tan, locally gypsiferous and micaceous, silty shale

Geologic contact
Dashed where approximately located; short dashed where indefinite



اصطلاحات الخريطة
MAP LEGEND

POPULATED PLACES
- City or town
- Village
- Village, name not given
- Fort, usually ruins

TRANSPORTATION
- Railroad with station
- Major road, unpaved
- Secondary road
- Road of questionable permanency
- Trail
- Landing field

HYDROGRAPHIC FEATURES
Only isolated wells are shown
- Dug well
- Drilled water well
- Spring
- Birkah, usually ruins
- Daḩl *(see glossary)*
- Intermittent stream
- Swamp
- Khabrā and wādī floor

HYPSOGRAPHIC FEATURES
- Generalized relief
- Relict drainage in bas-relief resulting from deflation
- Sand

Dense stipple represents mobile sand cover consisting primarily of dunes, linear ridges, and other individual sand forms, that are shown where map scale permits; moderately dense stipple represents more stabilized continuous sand cover; open stipple represents discontinuous sand cover.

Types of sand terrain

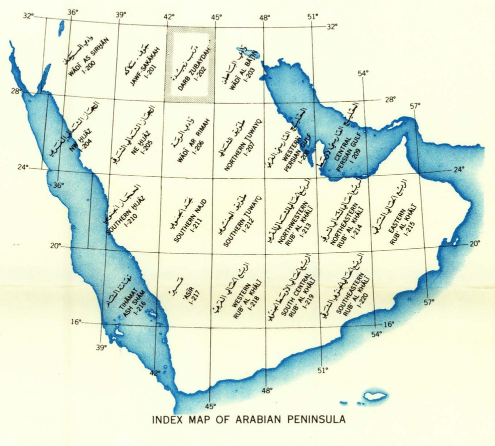
Transverse. *Predominantly simple and compound barchan dunes in areas of more mobile sand, and/or simple rounded ridges, both oriented transverse to the prevailing wind direction.*

Longitudinal. *Primarily dikākah and various types of undulating sand sheets, in general characterized by elongation of the individual topographic forms parallel to the prevailing wind direction, often partially stabilized by sparse vegetation.*

'Urūq. *Various forms of long, nearly parallel, sharp crested narrow sand ridges and dune chains separated by broad sand valleys usually including elements of type I sand terrain. These are the resultant of a system of two dominant wind directions and are identical to the sayf dunes of North Africa.*

"Sand mountains." *Dominated by large sand massifs commonly cresting 50 to 300 meters above the substratum, often with super-imposed dune patterns consisting of various types of complex barchans. Common forms are giant barchans spanning several kilometers from horn to horn; giant bisigmoidal and pyramidal sand peaks as well as other less common peak forms; and giant oval to elongate sand mounds.*

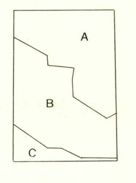
MISCELLANEOUS FEATURES
- Oil pipeline with pumping station
- Kilometer post — *Measured from Al Qayşūmah*
- Spot elevation (× 330 meters)
- Border survey triangulation station (∆ 500)
- Ruins
- International boundary



ايضاحات
GLOSSARY

'Ayn	Spring, solution pit, or well
Bi'r	Dug well
Birkah(t); diminutive, buraykah(t)	Cistern
Daḩl	Deep sink hole or solution cavity
Darb; diminutive, durayb	Road or trail
Fayḑah(t); pl.: Fiyāḑ	Closed basin with firm, flat, vegetation-covered mud surface, occasionally rocky and sandy
Hadhlūl; pl., Hadhālīl	Sha'ībs including inverted drainage channels
'Irq; pl.; 'Urūq	Long linear sand ridge
Jabal	Hill or mountain
Jāl	Rocky escarpment, low cliff, or side of a valley
Jaww	Pronounced sandy-bottomed depression or basin with gentle slopes
Khabb	Hollow between dunes or 'irqs
Khabrā'	Closed basin with firm, flat mud and silt surface, commonly barren and lacking vegetation
Khashm	Headland or promontory along a cliff or mountain front
Khawr	Salty or brackish well; saline bay or inlet
Maḩaţţah(t)	Railroad station
Nafūd, (Nefud)	Large area of sand dunes
Nahr	Stream, river
Nāziyah(t); pl., Nawāzī	dune
Qal'ah(t)	Fort
Qalīb; pl., Qulbān	Well, spring
Qārah(t)	Hill
Qaşr	Fort, palace, or castle
Rijlah(t)	Stream, wādī
Rujm, Rijm	Rock, cairn
Sabkhah(t)	Silt, clay, and sand flats often with saline incrustations
Şaḩrā'	Desert
Sha'īb, Shi'b	Same as wādī
Shaţţ	Stream, distributary
Sawḩ, Şayḩ	Small sha'īb
Tulūl; plural of Tall	Hill, mound
Wādī	Valley or dry water course

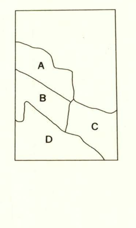
مصادر المجموعات الاساسية



A, compilation from published USAF Aeronautical Approach Chart 1:250 000 scale series, 1955; B, compilation from controlled vertical photography, 1951; and C, compilation from controlled vertical photography, 1956. Topographic representation by L. F. Ramirez and E. L. Elberg. Translation, transliteration, calligraphy and Arabic typography by Simon H. Kfoury, Charles D. Matthews and Michel H. Kfoury.

SOURCES OF BASE COMPILATION

مصادر المجموعات الجيولوجية



Geologic mapping by the Arabian American Oil Company; compiled by L. F. Ramirez from: A, combined field photo mapping and photogeology by J. S. Williams, C. W. Rock, and others, and some earlier reconnaissance field work by E. L. Berg, B. Beverly, Jr., Max Steineke and others; B, combined field photo mapping and photogeology by M. C. Coffield, W. H. Reiss, and some earlier reconnaissance field work by R. A. Bramkamp, E. L. Berg, B. Beverly, Jr. and others; C, combined field photo mapping and photogeology by W. H. Reiss, M. C. Coffield, S. J. Roach and others, and some earlier reconnaissance field work by R. A. Bramkamp, Max Steineke, S. B. Henry and others; and D, photogeologic compilation based on field work by A. F. Pocock, Max Steineke, S. J. Roach, N. M. Layne, Jr., and others.
Translation of the geologic explanation edited by Harold W. Glidden, U.S. Department of State.

SOURCES OF GEOLOGIC COMPILATION

المقياس ١ : ٥٠٠٠٠٠
Scale 1:500 000
10 0 10 20 30 40 50 Kilometers
10 0 10 20 30 Miles

Prepared by the U. S. Geological Survey and the Arabian American Oil Company under the joint sponsorship of the Kingdom of Saudi Arabia and the U. S. Department of State.

Lambert conformal conic projection; standard parallels 17° and 33°

Indicated positions of boundary lines not demarcated on the ground are not necessarily definitive

GEOLOGY OF THE DARB ZUBAYDAH QUADRANGLE, KINGDOM OF SAUDI ARABIA

By
Richard A. Bramkamp and Leon F. Ramirez

خريطة جيولوجية للوحة درب زبيدة بالمملكة العربية السعودية

وضع
ريتشارد برامكامب وليون راميرز

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أبحاث جيولوجية مختلفة
خريطة رقم ٢٠٢ A - I
MISCELLANEOUS GEOLOGIC INVESTIGATIONS
MAP I-202 A