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

المملكة العربية السعودية
وزارة المالية والاقتصاد الوطني
المديرية العامة لشؤون الزيت والمعادن
KINGDOM OF SAUDI ARABIA
MINISTRY OF FINANCE AND NATIONAL ECONOMY
DIRECTORATE GENERAL OF PETROLEUM AND MINERAL AFFAIRS

ابحاث جيولوجية مختلفة
خريطة رقم I-٢٠٧A
MISCELLANEOUS GEOLOGIC INVESTIGATIONS
MAP I-207A

W(500)

GEOLOGIC EXPLANATION

التفسير الجيولوجي

SEDIMENTARY ROCKS

الصخور الرسوبية

Qes — Eolian sand
الرمال المنسوفة بالرياح

QUATERNARY

Qs, Qg, Qu — Silt and gravel
Silt and associated fine sediments including caliche-like and gypsiferous deposits in undrained depressions, Qs; gravel composed chiefly of limestone and other rocks of local origin, includes older gravels in some areas, Qg; unconsolidated surficial deposits of silt, sand, and gravel, may include unrecognized equivalents of other units of Quaternary age, Qu

Qg_1, Qg_2, Qg_3 — Gravel
Limestone, quartz, or mixed limestone and quartz gravel in terrace deposits obviously related to present or recent drainage, Qg_1; sheetlike lag gravel deposits of quartz and other pebbles from the basement complex, Qg_2; gravel of limestone and other rocks occurring as dissected remnants unrelated to present drainage, Qg_3

TERTIARY — Miocene and Pliocene

Tg — Gravel
Mostly well-rounded white quartz pebbles

Tkl, Tkg, Tkgr, Tk, Tcg — Kharj formation and equivalent rocks
Lacustrine limestone, Tkl; gypsum, Tkg; gravel, Tkgr; Kharj formation, undifferentiated, Tk; gravel composed chiefly of limestone pebbles and cobbles locally cemented by dark slightly ferruginous caliche, approximately equivalent to the Kharj formation, Tcg

Tsm, Th — Sandstone, marl, and limestone
White and pink marly sandstone, sandy marl, and sandy limestone; locally cherty; contains nonmarine invertebrates. In places Hadrukh formation, Th, at base; includes gray, tan, cream, and pink calcareous silty sandstone, sandy limestone, and sandy marl. In Aş Şumman area Tsm discontinuously overlies Umm er Radhuma formation, Tsm/Tu

Paleocene and Eocene

Tu — Umm er Radhuma formation
Cream, tan, and gray limestone, dolomitic limestone, and dolomite

CRETACEOUS — Upper Cretaceous

Ka — Aruma formation
Gray, tan, and cream limestone interbedded with minor dolomite and olive-drab shale; yellowish-tan and brown calcareous shale, clayey dolomite, and limestone unit at top; of Campanian(?) and Maestrichtian age

Kw — Wasi'a formation
Buff, gray, brown, and varicolored quartz sandstone with dispersed quartz pebbles interbedded with varicolored shale and locally with thin dolomite beds; platy ironstone beds at several stratigraphic positions; of Cenomanian age. Includes beds questionably correlated with Wasi'a formation between Wādī al 'Atk and vicinity of Jabal Burmah. Upper soft sandstone of Biyadh sandstone of Early Cretaceous age mapped with Wasi'a formation between Jabal Burmah and Wādī as Sahba'; upper part of Arab formation of late Jurassic age mapped with Wasi'a formation in vicinity of latitude 25°45′ N., longitude 45°32′ E

Kb — Biyadh sandstone
Buff, white, gray, and red sandstone interbedded with varicolored shale; ironstone layers at several stratigraphic positions, particularly in lower part; thin dolomite member 60 to 70 meters below top in the extreme south; includes beds questionably correlated with Wasi'a formation in eastern part of Sha'ib Nisāḥ; of Aptian and Albian age

Lower Cretaceous — Thamama group

Kbu — Buwaib formation
Cream-colored soft limestone with a few thin brown calcarenite beds containing numerous shell fragments in the lower part; soft sandstone in upper part; probably of Aptian age

Ky — Yamama formation
Brown and tan calcarenite interbedded with cream-colored soft limestone; probably of Neocomian age

Ks — Sulaiy formation
Cream and tan compact limestone with infrequent thin calcarenite and coquina layers, locally partly dolomitized; basal part contains much interbedded calcarenite and some breccia; probably of Neocomian age

JURASSIC — Upper Jurassic

Jhi — Hith anhydrite
Light blue gray massive anhydrite. The only outcrop known in map area is in the overhanging face of Dahl Hit

Ja — Arab formation
Brown and tan limestone, calcarenite, and dolomite; usually disturbed, and in places brecciated by solution-collapse

Jj — Jubaila limestone
Cream-colored compact limestone containing a few calcarenite layers and, near top, a few thin dolomite units; of Kimmeridgian age

Jh — Hanifa formation
Cream and tan soft limestone; minor interbedded marl and tan clay shale; several brown calcarenite beds, partly oolitic in middle and upper parts. Colonial corals common in middle and upper parts; possibly of Oxfordian age

Jtm — Tuwayq Mountain limestone
Cream and white massive, compact limestone forming major cliffs of Tuwayq Mountains; includes a basal marly unit and locally a few thin calcarenite layers; of Callovian age

Middle Jurassic

Jd — Dhruma formation
In south, tan limestone with interbedded brown calcarenite; partly oolitic; olive-drab clay shale at top. Between latitudes 25° and 25°30′ N., sandstone beds appear and increase in prominence to north, where section is chiefly buff, brown, and red sandstone, varicolored shale, and minor platy ironstone layers; of Bajocian and Bathonian age

Lower Jurassic

Jm — Marrat formation
Golden-brown to tan limestone and dolomite with middle member of dark brick-red silty shale and thin sandstone beds; of Toarcian age

TRIASSIC OR JURASSIC

J̄Rm — Minjur sandstone
Buff, massive, usually cross-bedded sandstone with irregularly distributed varicolored shale, sandy shale, and shaly sandstone; minor beds of ironstone at several horizons. Quartz pebbles numerous in some sandstone beds

TRIASSIC

R̄j — Jilh formation
Buff silty to massive and coarse-grained sandstone and interbedded green, purple, and red siltstone and shale in south; few thin limestone beds. Uppermost beds are arenaceous oolite and oolitic sandstone. Thin layers of platy black and brown ironstone abundant in the upper part. Grades to limestone and subordinate dolomite and shale in north, with several anhydrite members in upper part. Marine fossils occur in limestone beds in middle and upper parts

PERMIAN OR TRIASSIC

R̄Ps — Sudair shale
Brick- to dark-red massive shale; minor pale greenish-white siltstone and soft fine-grained sandstone near base; massive crystalline gypsum in beds a meter or more thick in the middle and lower parts

PERMIAN

Pk — Khuff formation
Tan and gray limestone, interbedded argillaceous limestone, dolomite, marl, and gypsiferous clay; a varicolored sandstone and shale unit is present at base in most places

CAMBRIAN(?)

Ꞓs — Saq sandstone
Brown, red, and buff massive sandstone. Beds overlying the unit elsewhere contain Lower Ordovician graptolites

IGNEOUS AND METAMORPHIC ROCKS

الصخور النارية والمتحولة

PRE-PERMIAN

Dikes of rhyolite, diabase, and andesite
Includes some aplite and pegmatite

g — Granite
Generally red or pink; includes some layered intrusive rocks

d — Diorite and related rocks

m — Andesite and fine-grained dioritic rocks, flows, and intrusives
Includes interbedded phyllite, quartzite, graywacke, conglomerate, and marble

as — Amphibolite schist
Includes minor beds of quartzite

s — Sericite and chlorite schist
Includes minor lenses of quartz and marble

Contact
Dashed where approximately located

Fault
Dashed where approximately located; dotted where concealed or projected. U, upthrown side; D, downthrown side

Monocline
Trace of axis dashed where approximately located; dotted where projected; arrows indicate downfolded side

Trend lines
Showing lineation in basement rocks

MAP LEGEND

اصطلاحات الخريطة

POPULATED PLACES
- Town
- Village
- Ruins
- Areas under cultivation
- Date gardens

TRANSPORTATION
- Normal gauge, single track railroad, with station
- Major road
- Secondary road
- Road of questionable permanency
- Camel trail
- Airport
- Landing field

HYDROGRAPHIC FEATURES
Only isolated wells are shown
- Dug well
- Drilled water well
- Dry well
- Daḩl
- Ditch
- Intermittent stream
- Sabkhah

HYPSOGRAPHIC FEATURES
- Generalized relief
- 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

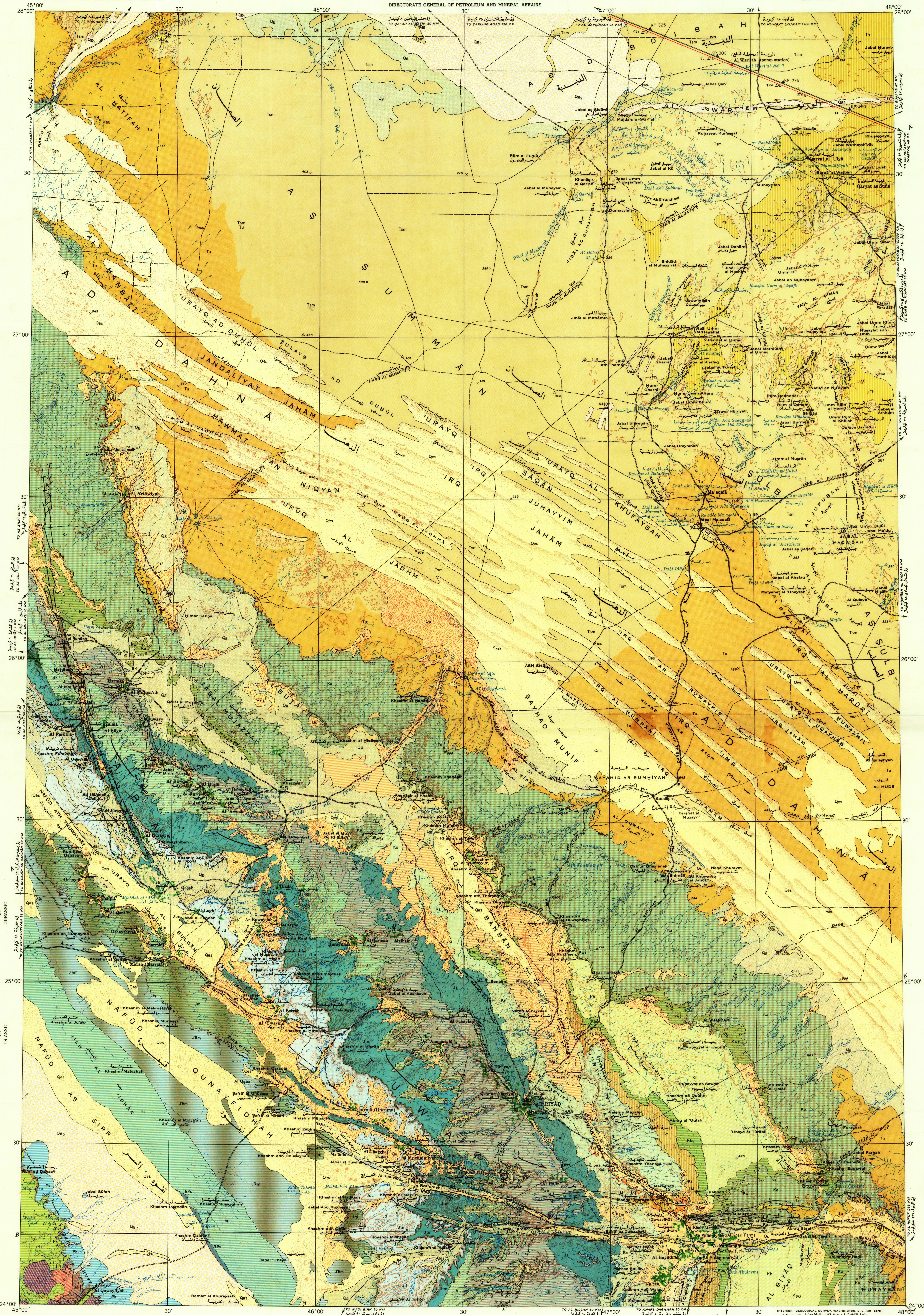
I — Transverse. *Predominantly simple and compound barchan dunes in areas of more mobile sand, and or simple rounded ridges, both oriented transverse across the prevailing wind direction*

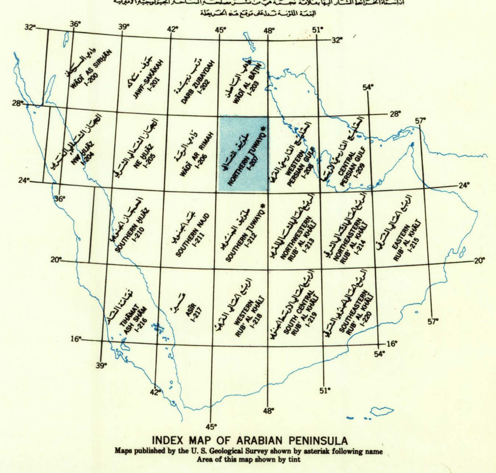
II — Longitudinal. *Primarily dikākah and various types of undulating sand sheets, in general characterized by elongation of the individual topographic forms parallel to the prevailing wind direction, often partially stabilized by sparse vegetation*

III — '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*

IV — "Sand mountains." *Dominated by large sand massifs commonly cresting 50 to 300 meters above the substratum, often with superimposed 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
- Water pipeline
- KP 325 — Kilometer post *Measured from Al Qaţīf*
- ×308 — Spot elevation in meters
- BM×628 — Benchmark
- △383 — Triangulation station



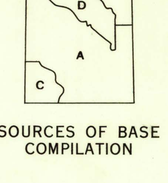


GLOSSARY

ايضاحات

ابرق	Abraq	Rocky hill with sand on slopes
عين	'Ayn	Spring, solution pit, or well
بطن	Baţn	Depression or hollow, usually elongate
بئر ج بئار	Bi'r; pl., Bi'ār	Dug well
دحل	Daḩl	Deep sink hole or solution cavity
درب	Darb	Road or trail
دبدبة	Dibdibah(t)	Extensive featureless upland gravel plains
عرق ج عروق	'Irq; pl., 'Urūq	Long linear sand ridge
جبل ج جبال	Jabal; pl., Jibāl	Hill or mountain
جال	Jāl	Rocky escarpment, low cliff, or side of a valley
جندلية	Jandalīyah(t)	Long narrow sand-free band of scattered rock outcrops between 'Urūq
جو	Jaww	Pronounced sandy-bottomed depression or basin with gentle slopes
جله	Jilh	Barren ground
جربة	Jurubah(t)	Depressions within dissected şummān
خب	Khabb	Narrow bands of plains between 'Irq, commonly without rock outcrop
خبرا	Khabrā	Closed basin with firm, flat mud and silt surface, commonly barren and lacking vegetation
خفس	Khafs	Pond in a natural depression
خليقة	Khalīqah(t)	Wide-mouthed sink hole or solution cavity
خشم	Khashm	Headland or promontory along a cliff or mountain front
مشاش	Mishāsh	Shallow hand-dug well
نفود	Nafūd	Large area of sand dunes
نقا	Naqā	Isolated large prominent sand dune
قصر	Qaşr	Fort, palace, or castle
رملة	Ramlah(t)	Sand area
روضة	Rawḑah(t)	Closed basin with firm, flat, vegetation-covered mud surface, occasionally rocky and sandy
رجم	Rijm	Rock cairn
سبخة	Sabkhah(t)	Silt, clay, and sand flats, often with saline incrustations
ساقية	Sāqiyah(t)	Ditch
شعيب	Sha'īb	Same as wādī
شيط	Shayyiţ	Long sinuous wādī or valley
صمان	Şummān	Extensive, rocky, plateau-like area ranging from a plain to shallowly dissected area
سوق	Sūq	Market place
عريق تصغير عرق	'Urayq (diminutive of 'Irq)	Small linear sand ridges
وادي ج وديان	Wādī; pl., Widyān	Valley or dry water course

مصادر المجموعات الاساسية

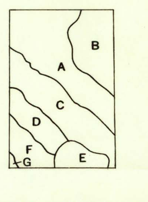


SOURCES OF BASE COMPILATION

Compilation and topographic representation by the Arabian American Oil Company: A, land surface and adjusted aerial photographic surveys; B, recompilation from plane table surveys; C, trimetrogon aerial photography; D, unadjusted aerial photography; and X, reconnaissance land surface surveys.

Topographic representation by L. F. Ramirez, Arabian American Oil Company.

مصادر المجموعات الجيولوجية



SOURCES OF GEOLOGIC COMPILATION

Geologic mapping by the Arabian American Oil Company, compiled by R. A. Bramkamp and L. F. Ramirez, based on field surveys by: A, Max Steineke and others; B, T. F. Harris and others; C, S. J. Roach and others; D, D. A. Holm and A. F. Pocock and others; E, R. A. Bramkamp and G. F. Brown (U.S.G.S.); F, Max Steineke and others; and G, based on field surveys and compilation by R. O. Jackson (U.S.G.S.).

This map printed in two sheets: Sheet A geology and geography combined; Sheet B geography only. Available at the Directorate General of Petroleum and Mineral Affairs, Ministry of Finance and National Economy, Jiddah and Ad Dammām, Saudi Arabia, and at the U. S. Geological Survey, Washington D. C., U. S. A.

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Scale 1:500 000

Kilometers 10 0 10 20 30 40 50
Miles 10 0 10 20 30

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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°

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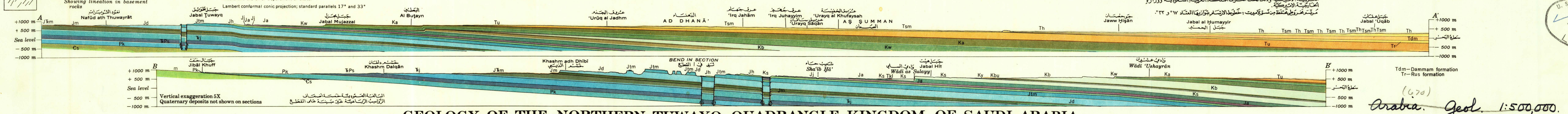

GEOLOGY OF THE NORTHERN TUWAYQ QUADRANGLE, KINGDOM OF SAUDI ARABIA

By Richard A. Bramkamp and Leon F. Ramirez

خريطة جيولوجية للوحة طويق الشمالي بالمملكة العربية السعودية

وضع
السيدين ريتشارد برمكامب وليون راميرز

ابحاث جيولوجية مختلفة
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