Prepared in cooperation with the Ministry of Petroleum, Energy and Mines, Islamic Republic of Mauritania

Second Projet de Renforcement Institutionnel du Secteur Minier de la République Islamique de Mauritanie (PRISM-II)

Permissive Tracts for Sediment-Hosted Lead-Zinc-Silver Deposits in the Islamic Republic of Mauritania:

Phase V, Deliverable 73

By Jeffrey L. Mauk

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Multiple spellings are used in various literatures, and may be reflected in the text.

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

The report is being released in both English and French. In both versions, we use the French-language names for formal stratigraphic units.

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Contents

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Conversion Factors

SI to Inch/Pound

Multiply	By	To obtain
	Length	
centimeter (cm)	0.3937	inch (in.)
millimeter (mm)	0.03937	inch (in.)
decimeter (dm)	0.32808	foot (ft)
meter (m)	3.281	foot (ft)
kilometer (km)	0.6214	mile (mi)
	Area	
hectare (ha)	2.471	acre
square meter (m^2)	0.0002471	acre
square kilometer (km^2)	0.3861	square mile (mi^2)
	Volume	
cubic kilometer (km^3)	0.2399	cubic mile (mi^3)
	Mass	
gram (g)	0.03527	ounce, avoirdupois (oz)
kilogram (kg)	2.205	pound avoirdupois (lb)
megagram (Mg)	1.102	ton, short (2,000 lb)
megagram (Mg)	0.9842	ton, long (2,240 lb)
metric ton per day	1.102	ton per day (ton/d)
megagram per day (Mg/d)	1.102	ton per day (ton/d)
metric ton per year	1.102	ton per year (ton/yr)
	Pressure	
kilopascal (kPa)	0.009869	atmosphere, standard (atm)
kilopascal (kPa)	0.01	bar
	Energy	
joule (J)	0.0000002	kilowatt hour (kWh)

ppm, parts per million; ppb, parts per billion; Ma, millions of years before present; m.y., millions of years; Ga, billions of years before present; 1 micron or micrometer (μor μm) = 1×10^{-6} meters; Tesla (T) = the field intensity generating 1 Newton of force per ampere (A) of current per meter of conductor

Temperature in degrees Celsius (°C) may be converted to degrees Fahrenheit (°F) as follows:

°F=(1.8×°C)+32

Temperature in degrees Fahrenheit (°F) may be converted to degrees Celsius (°C) as follows:

°C=(°F-32)/1.8

Coordinate information is referenced to the World Geodetic System (WGS 84)

Acronyms

AMT	Audio-magnetotelluric
ASTER	Advanced Spaceborne Thermal Emission and Reflection Radiometer
AVIRIS	Airborne Visible/Infrared Imaging Spectrometer
BIF	Banded iron formation
BLEG	Bulk leach extractable gold
BGS	British Geological Survey
BRGM	Bureau de Recherches Géologiques et Minières (Mauritania)
BUMIFOM	The Bureau Minier de la France d'Outre-Mer
CAMP	Central Atlantic Magmatic Province
CGIAR-CSI	Consultative Group on International Agricultural Research-Consortium for Spatial Information
DEM	Digital Elevation Model
DMG	Direction des Mines et de la Géologie
EC	Electrical conductivity
EMPA	Electron Microprobe Analysis
EM	Electromagnetic (geophysical survey)
EOS	Earth Observing System
eU	Equivalent uranium
GGISA	General Gold International
GIF	Granular iron formation
GIFOV	Ground instantaneous field of view
GIS	Geographic Information System
HIF	High grade hematitic iron ores
IHS	Intensity/Hue/Saturation
IAEA	International Atomic Energy Agency
IOCG	Iron oxide copper-gold deposit
IP	Induced polarization (geophysical survey)
IRM	Islamic Republic of Mauritania
JICA	Japan International Cooperation Agency
JORC	Joint Ore Reserves Committee (Australasian)
LIP	Large Igneous Province
LOR	Lower limit of reporting
LREE	Light rare-earth element
METI	Ministry of Economy, Trade and Industry (Japan)
MICUMA	Société des Mines de Cuivre de Mauritanie
MORB	Mid-ocean ridge basalt
E-MORB	Enriched mid-ocean ridge basalt
N-MORB	Slightly enriched mid-ocean ridge basalt
T-MORB	Transitional mid-ocean ridge basalt
Moz	Million ounces
MVT	Mississippi Valley-type deposits
NASA	United States National Aeronautics and Space Administration

NLAPS	National Landsat Archive Processing System
OMRG	Mauritanian Office for Geological Research
ONUDI	(UNIDO) United Nations Industrial Development Organization
PRISM	Projet de Renforcement Institutionnel du Secteur Minier
PGE	Platinum-group elements
RC	Reverse circulation drilling
REE	Rare earth element
RGB	Red-green-blue color schema
RTP	Reduced-to-pole
SARL	Société à responsabilité limitée
SEDEX	Sedimentary exhalative deposits
SIMS	Secondary Ionization Mass Spectrometry
SNIM	Société National Industrielle et Minière (Mauritania)
SP	Self potential (geophysical survey)
SRTM	Shuttle Radar Topography Mission
SWIR	Shortwave infrared
TDS	Total dissolved solids
TIMS	Thermal Ionization Mass Spectrometry
TISZ	Tacarat-Inemmaudene Shear Zone
TM	Landsat Thematic Mapper
UN	United Nations
UNDP	United Nations Development Program
US	United States
USA	United States of America
USGS	United States Geological Survey
UTM	Universal Transverse Mercator projection
VHMS	Volcanic-hosted massive sulfide
VisNIR	Visible near-infrared spectroscopy
VLF	Very low frequency (geophysical survey)
VMS	Volcanogenic massive sulfide deposit
WDS	Wavelength-dispersive spectroscopy
WGS	World Geodetic System

Second Projet de Renforcement Institutionnel du Secteur Minier de la République Islamique de Mauritanie (PRISM-II)

Permissive Tracts for Sediment-Hosted Lead-Zinc-Silver Deposits in the Islamic Republic of Mauritania:

Phase V, Deliverables 73

By Jeffrey L. Mauk[1]

1 Summary

Although Mississippi Valley-type (MVT) deposits have not been recognized in Mauritania there are permissive tracts for these deposits in the regionally extensive Proterozoic carbonate rocks of the Taoudeni Basin. Permissive tracts for undiscovered MVT Pb-Zn-Ag deposits in the Proterozoic carbonate units are supported by the occurrences of MVT mineral and alteration assemblages, presence of evaporites, proximity to major orogenic events that have produced MVT ores elsewhere, red bed sequences and basal aquifers that may have been potential brine migration pathways for large MVT hydrothermal systems.

Permissive tracts for SEDEX (sedimentary exhalative) deposits coincide with those for MVT deposits. However, the geodynamic setting of the Taoudeni Basin is unlike that of SEDEX ores elsewhere on Earth, and therefore the potential for this class of deposits must be rather low. SEDEX deposits occur along tectonically active, shale dominated passive margins or in intracontinental rift basins.

2 Introduction

Sediment-hosted Pb-Zn deposits are divided into two broad sub-types: MVT (Mississippi Valley-type) and SEDEX (sedimentary exhalative). Deposits of both sub-types display a broad range of relationships to enclosing host rocks that includes stratiform, stratabound, and discordant ores. Mississippi Valley-type and SEDEX deposits have similar mineral assemblages consisting of sphalerite and galena, and iron sulfide minerals can be abundant in some deposits. Minor amounts of copper minerals and barite may be present. Common alteration minerals include siderite, ankerite, calcite or dolomite.

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Mississippi Valley-type deposits dominantly formed in platform carbonate sequences, mostly in extensional zones inboard of orogenic belts, whereas SEDEX deposits formed in intra-continental or failed rifts, and in passive continental margins. Sedimentary packages that contain SEDEX and MVT deposits have similar stratigraphic elements, consisting of a basal clastic and (or) volcanic dominated succession, which is overlain by shales and (or) carbonates. SEDEX deposits are hosted mainly by reduced, fine-grained siltstones-shales-mudstones and (or) carbonate units within clastic sediments, whereas MVT deposits are located in carbonate-dominated sequences. Although most SEDEX and many MVT deposits were localized by extensional faults, SEDEX deposits are mainly related to growth faults active at the time of mineralization.

Most MVT ores are tens of millions of years younger than their host rocks; however, a few are close (<~5 m.y.) to the age of their host rocks. In the absence of direct dates for SEDEX deposits, their age of formation is generally constrained by relationships to sedimentary or diagenetic features in the rocks. These studies suggest that deposition of most SEDEX ores was coeval with sedimentation or early diagenesis, whereas some deposits formed at least 20 m.y. after sedimentation.

MVT deposits are mainly a Phanerozoic phenomenon; the ages of their host rocks as well as ages of ore deposition are mainly Phanerozoic. Nevertheless, important MVT deposits do occur in Archean and Proterozoic rocks. The oldest MVT deposit in the world is the Pering deposit in South Africa that is hosted by Archean stromatolitic limestone; however, ore formation occurred during the Mesoproterozoic (Schaefer, 2002). The ages of SEDEX deposits are grouped into two major groups: one in the Proterozoic and another in the Phanerozoic.

Exploration and Mineral Assessment for MVT and SEDEX deposits: Leach and others (2005) summarized the important ore deposit attributes that can be used to assess the favorability for undiscovered MVT and SEDEX deposits. These attributes form the basis for identifying permissive mineral tracts for MVT and SEDEX deposits in Mauritania.

MVT deposits

Global attributes

1. Ore is hosted in platform carbonate sequences. Phanerozoic carbonate sequences have greater potential for hosting MVT ores relative to Archean and Proterozoic carbonates.
2. Districts and deposits are regionally associated with evaporites or evaporative facies. Location within evaporative latitudes during ore formation is considered highly favorable.
3. The most important ore controls are extensional faults that were active during major contractional tectonic events. Favorability is related to the density of faulted terrain and proximity (~ 500 km) to major orogenic belt.

Regional attributes

1. Locally important assessment criteria include extensive dissolution collapse breccias, paleokarst, and erosional unconformities.

2. Higher potential is given to carbonate sequences containing regional aquifers, basal sandstones, and red bed sequences.
3. Regional permeability contrasts expressed by shale edges, limestone to dolostone transitions, and basement topography.
4. Presence of geochemical anomalies and mineral occurrences are highly suggestive indicators of the effects of large hydrothermal systems required for MVT deposits. Geochemical indicator elements include Zn, Pb, As, Tl, and Cd. Mineral indicators are barite and sparry dolomite cement that may form widespread halos about mineralized regions.

SEDEX Deposits—Global Attributes

1. The presence of mixed clastic and carbonate sedimentary sequences in Atlantic style passive margins and intracontinental rift basins.
2. SEDEX deposits are absent from rocks older than 2.2 Ga and are notably absent from rocks about 1.4 to 0.6 Ga in age. Therefore, sedimentary sequences older than 2.2 and between 1.4 to 0.6 Ga are considered unfavorable for SEDEX deposits.
3. The presence of evaporites or evaporative facies in proximal sedimentary environments, or indications that the tectonic environment was active in evaporative latitudes are highly favorable.
4. The presence of sedimentary facies that are enriched in organic matter that occur in passive margins and intracontinental rift basins are favorable.
5. The presence of active growth and (or) transtensional faults in the above mentioned sedimentary sequences are favorable.
6. Higher potential is given to tectonic environments that contain regional aquifers, basal sandstones and red bed sequences.
7. Presence of geochemical anomalies and (or) mineral occurrences with stratiform or tabular forms that extend for tens of kilometers. Important geochemical anomalies are Mn, Fe, Zn, and Tl.

3 Mineral Deposits and Occurrences in Mauritania

3.1 Mississippi Valley-Type (MVT) Pb-Zn Deposits

Mississippi Valley-type deposits have not been recognized in Mauritania despite the presence of regionally extensive Proterozoic carbonate rocks in the stratigraphic sequence of the vast Taoudeni Basin. The remarkable absence of MVT deposits is likely due in part to the lack of modern exploration efforts for these deposits, limited geochemical and geological data that are useful for assessments, and the generally low global potential for carbonate rocks older than about 900 Ma to host MVT deposits.

In the report prepared as part of Phase 5 of the USGS program for PRISM-II (Marsh and Anderson, 2015) there are geochemical data from samples of stratiform mineralization that are suggestive of being indicators for “syngenetic” mineralization. These occurrences are:

a. **Gouirat El Khatt**—Three samples of stromatolitic limestone, collected by J.P. Mroz in the Phase I PRISM report, contain disseminated galena with lesser amounts of sphalerite and copper minerals in a stratiform zone extending more than 25 kilometers (km) (fig. 1). The samples are from stromatolitic limestone in the Mesoproterozic Khatt Formation in the El Mreïti Group. This zone of mineralization is interpreted to be syngenetic in origin but with an aspect of epigenetic mineralization. Gangue calcite and dolomite are associated with the mineralized zone. The report notes that fractured zones are mineralized.

b. **Timzac**—One sample of mineralization is reported to be in the upper part of the Char Group (fig. 1). The notes in PRISM-I state that the mineralization extends for more than 16 km. This occurrence is described as stratiform in nature and contains dolomite, sphalerite, and geochemical anomalies of lead.

It is important to note that the presence of MVT-style mineralization, even in minor to trace amounts as in the above occurrences, is highly suggestive of a larger hydrothermal system that may have produced undiscovered ore deposits in the region. Typical MVT ore forming processes generally are regional in scale, affecting thousands of square kilometers and may produce widespread traces of mineralization. Furthermore, carbonate-hosted mineralization with a stratiform nature has commonly been misinterpreted as syngenetic in origin. As Leach and others (2005) point out, this is not necessarily correct, and many MVT deposits with stratiform mineralization have commonly been misclassified as SEDEX. Considerably more examination is needed to arrive at more rigorous classification for the Mauritania occurrences.

3.2 SEDEX Pb-Zn Deposits

No confirmed SEDEX lead-zinc deposits have been described in Mauritania. However, the potential for SEDEX mineralization in the southern Mauritanides was suggested in the PRISM-I reports and include the Ba-Mn-(Au) stratiform deposits (Bou Zrabie, Mbout, Eli Ajar, Ouechkech, Vararate Sud, and Oued d’Amour) hosted by the Groupe d'El Mseigguem. These deposits have been compared to deposits in the Carolina Slate Belt of the U.S. However, USGS review of these deposits (Taylor and Giles, 2014) concluded that this classification is unjustified. A more likely classification is that these occurrences are similar to volcanic hosted massive sulfide deposits (veins and tabular ore bodies).

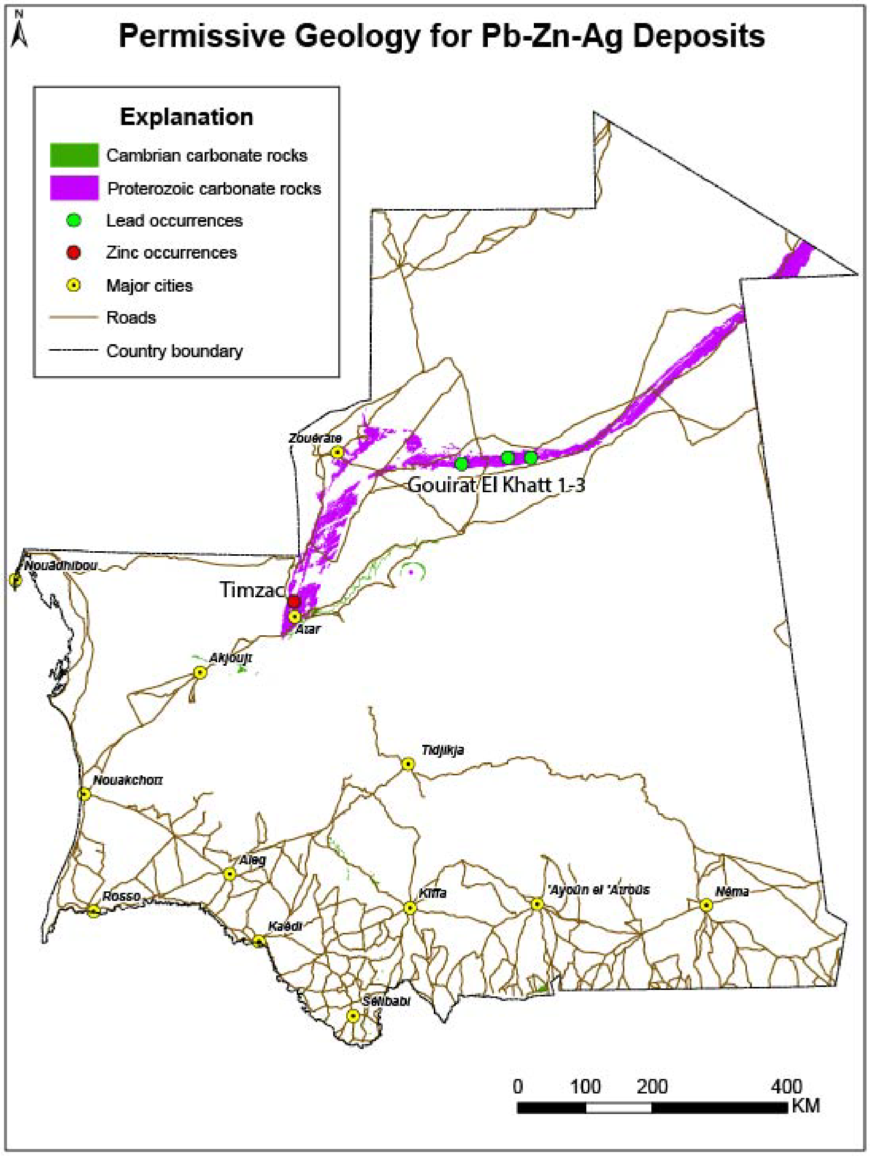

Figure 1. Permissive geology for Pb, Zn, and Ag deposits in sedimentary rocks.

Potential for SEDEX lead-zinc mineralization is recognized in the Taoudeni Basin. The presence of geochemical and mineralogical data that are favorable for MVT mineralization must also be considered permissive for SEDEX in the Taoudeni Basin. These occurrences are described in section 4.1 and include:

c. **Gouirat El Khatt**—Three samples of stromatolitic limestone, collected by J.P. Mroz in the Phase I PRISM report, contain disseminated galena with lesser amounts of sphalerite and copper minerals in a stratiform zone extending more than 25 kilometers (km) (fig. 1). The samples are from stromatolitic limestone in the Mesoproterozic Khatt Formation in the El Mreïti Group. This zone of mineralization is interpreted to be syngenetic in origin but with an aspect of epigenetic mineralization. Gangue calcite and dolomite are associated with the mineralized zone. The report notes that fractured zones are mineralized.

d. **Timzac**—One sample of mineralization is reported to be in the upper part of the Char Group (fig. 1). The notes in PRISM-I state that the mineralization extends for more than 16 km. This occurrence is described as stratiform in nature and contains dolomite, sphalerite, and geochemical anomalies of lead.

4 Potential Mineral Tracts

4.1 Mississippi Valley-Type Pb-Zn (Ag) Deposits

The vast Proterozoic and Paleozoic Taoudeni Basin represents a major epicratonic platform sedimentary sequence of the West African craton. The sedimentary cover of the Taoudeni Basin includes regionally extensive carbonate rocks, dominantly stromatolitic limestone and dolomitized limestones, which are potential hosts for MVT ores. Favorable units include the El Mreïti Group, the Char Group and the Atar Group, which comprise a 400 meter (m) thick Proterozoic section of dominantly siliciclastic rocks with alternating sections of stromatolite-bearing carbonates (fig. 2). Figure 1 shows the distribution of sedimentary rocks of the Taoudeni Basin that are classified as dominantly carbonate (Bradley and others, 2015). The El Mreïti Group, the Char Group and the Atar Group are highlighted because they contain, or are spatially related to MVT style mineralization, and they contain geological attributes that are favorable environments for MVT mineralization.

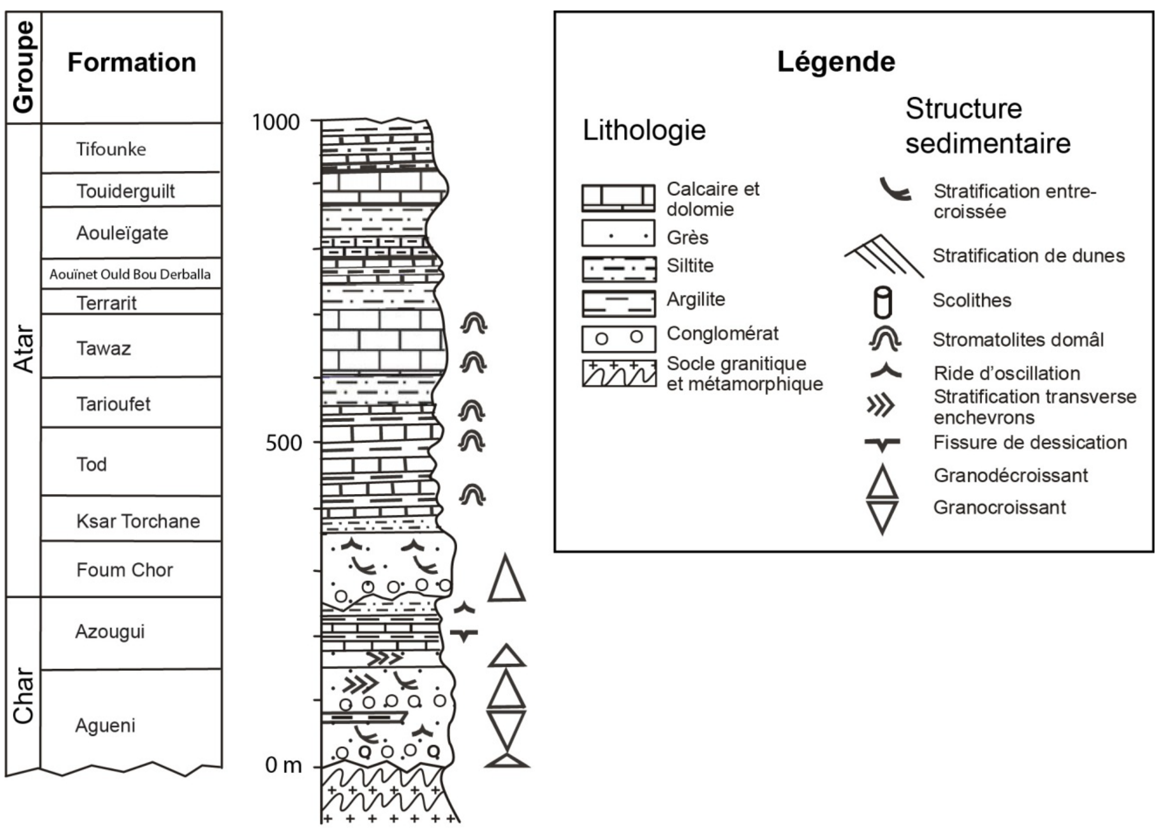

Figure 2. Generalized stratigraphy of part of the Hodh Supergroup. Redrawn from Pitfield and others. (2004).

The attributes of the Proterozoic rocks in Mauritania that favor MVT mineralization include:

1. Carbonate rocks of the El Mreïti Group, the Atar Group and the Char Group comprise a vast Proterozoic carbonate platform of the Taoudeni Basin.
2. There are occurrences of MVT style mineralization in these rocks.
3. Mauritania and the Taoudeni Basin experienced major orogenic events that are essential for producing regional MVT hydrothermal systems and the fracture/fault controlled permeability required for large scale brine migration. These include the important continental-scale ore-forming events of the Pan African and the Hercynian orogenies.
4. The presence of evaporites and evaporative environments, which are essential for generating the sedimentary brines that are the MVT ore fluids.
5. The presence of extensive unconformities that provide a network of karst dissolution features that focus ore fluid migration.
6. The presence of basal siliciclastic aquifers in the basin that can provide long distance fluid flow.
7. The presence of red bed sequences in the basin can provide important sources for the metals.

Despite these favorable attributes for the presence of undiscovered MVT resources in the Taoudeni Basin, on a global perspective, there are few economic MVT deposits hosted by Proterozoic carbonates (see discussion in Leach and others, 2005). Globally, abundant stromatolites characterize the Archean and Proterozoic carbonate platforms. The appearance of abundant MVT deposits in the latest Neoproterozoic and early Phanerozoic marks the transition from carbonate platforms consisting of relatively impermeable stromatolitic limestone to platforms dominated by bioclastic carbonates. This observation supports the contention that carbonates older than the latest Neoproterozoic in the Taoudeni Basin have significantly lower potential for MVT deposits. Nevertheless, the Pering and Bushy Park MVT deposits in South Africa are hosted in highly fractured and karsted Archean stromatolitic limestone. Therefore, consideration of fault density and distribution of unconformities in the carbonates of the Taoudeni Basin will yield a higher confidence in the delineation of favorable tracts.

An additional permissive favorable track includes the carbonate-bearing siliciclastic rocks of Cambrian age. These rocks must be considered permissive tracts for MVT deposits based on the presence of carbonate rocks of this age that are favored host rocks for MVT deposits on a global scale.

The other area of Mauritania that could be considered permissive for MVT deposits is the Coastal Basin, which includes Mesozoic to Cenozoic sedimentary rocks that are up to 9 km thick in the depocenter to the west of Noukchott (Pitfield and others, 2004). The Coastal Basin is part of the Senegal Basin, which is the largest Atlantic margin basin in northwest Africa (Wissmann, 1982). The Cenozoic rocks in the Coastal Basin are not permissive for MVT deposits, because Cenozoic rocks do not host MVT deposits elsewhere (Leach and others, 2005). The Mesozoic rocks are permissive because Jurassic and Cretaceous rocks elsewhere host MVT deposits, including: the El Abed deposit, Algeria (38 Mt @ 2.3 percent Pb, 3.5 percent Zn); the Mehdiabad deposit, Iran (217 Mt @ 2.3 percent Pb, 7.2 percent Zn); and the Reocin deposit, Spain (62 Mt @ 1.4

percent Pb, 11.0 percent Zn) (Leach and others, 2005; Bouabdellah and others, 2012; and references therein).

The Coastal Basin formed as a result of rifting that led to the breakup of Gondwana, which began along the present northwestern margin of Africa in the Middle Triassic. Crustal separation that created the Central Atlantic began in the Early Jurassic (Janssen and others, 1995). The early rifting produced a sedimentary environment conducive to the accumulation of thick Triassic salt deposits, whereas the marine conditions in the Jurassic and Cretaceous allowed development of carbonate rocks in the offshore region of the Mauritanian segment of the Coastal Basin (fig. 3). Mesozoic sedimentary rocks of the Coastal Basin thin onshore, and then pinch out to the east; at the outcrops that delineate the eastern margin of the Coastal Basin, Cenozoic sedimentary rocks sit unconformably on Paleozoic to Precambrian basement (Pitfield and others, 2004). This onshore thinning of the Coastal Basin means that if carbonate rocks occur in the onshore Mesozoic stratigraphy, they may occur at a shallow enough depth to form a permissive tract for MVT deposits. This hypothetical permissive tract is entirely concealed, because the Mesozoic carbonate rocks do not outcrop onshore in the Coastal Basin. Delineation of such a permissive tract would require lithofacies mapping of the concealed Mesozoic sediments in the onshore region of the Coastal Basin. Published data do not provide sufficient detail to allow this, but future research that delineates the distribution of lithofacies in the subsurface would be very worthwhile for mineral and petroleum prospectivity studies. Nevertheless, available offshore data indicate that there is a very low probability that substantial thicknesses of Mesozoic carbonate rocks occur in the onshore portion of the Coastal Basin (Brownfield and Charpentier, 2003; fig. 4), so at this time the onshore portion of the Coastal Basin cannot be considered permissive for MVT deposits because it does not appear to contain favorable host rocks.

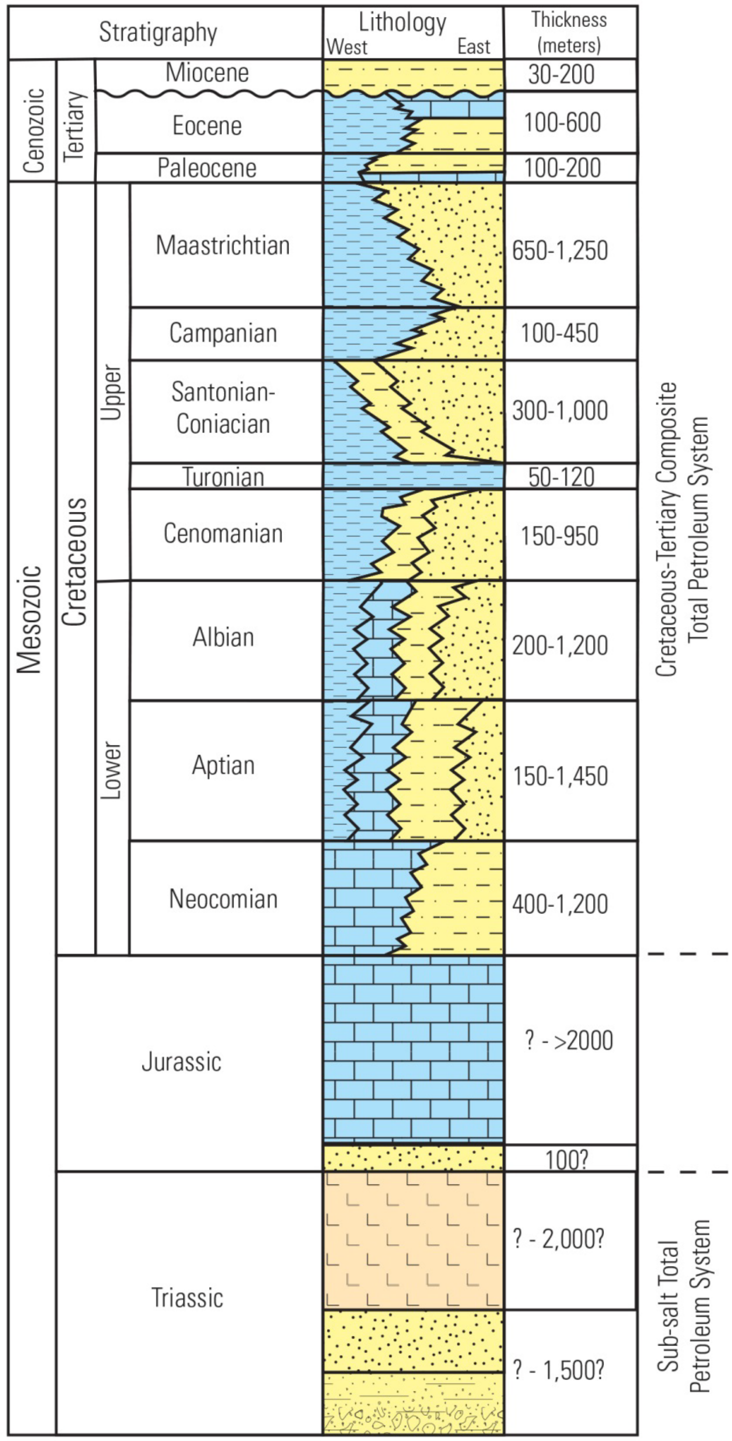

Figure 3. Generalized stratigraphic column for the Northern subbasin and the southern part of the Mauritania subbasins (modified from Brownfield and Charpentier, 2003).

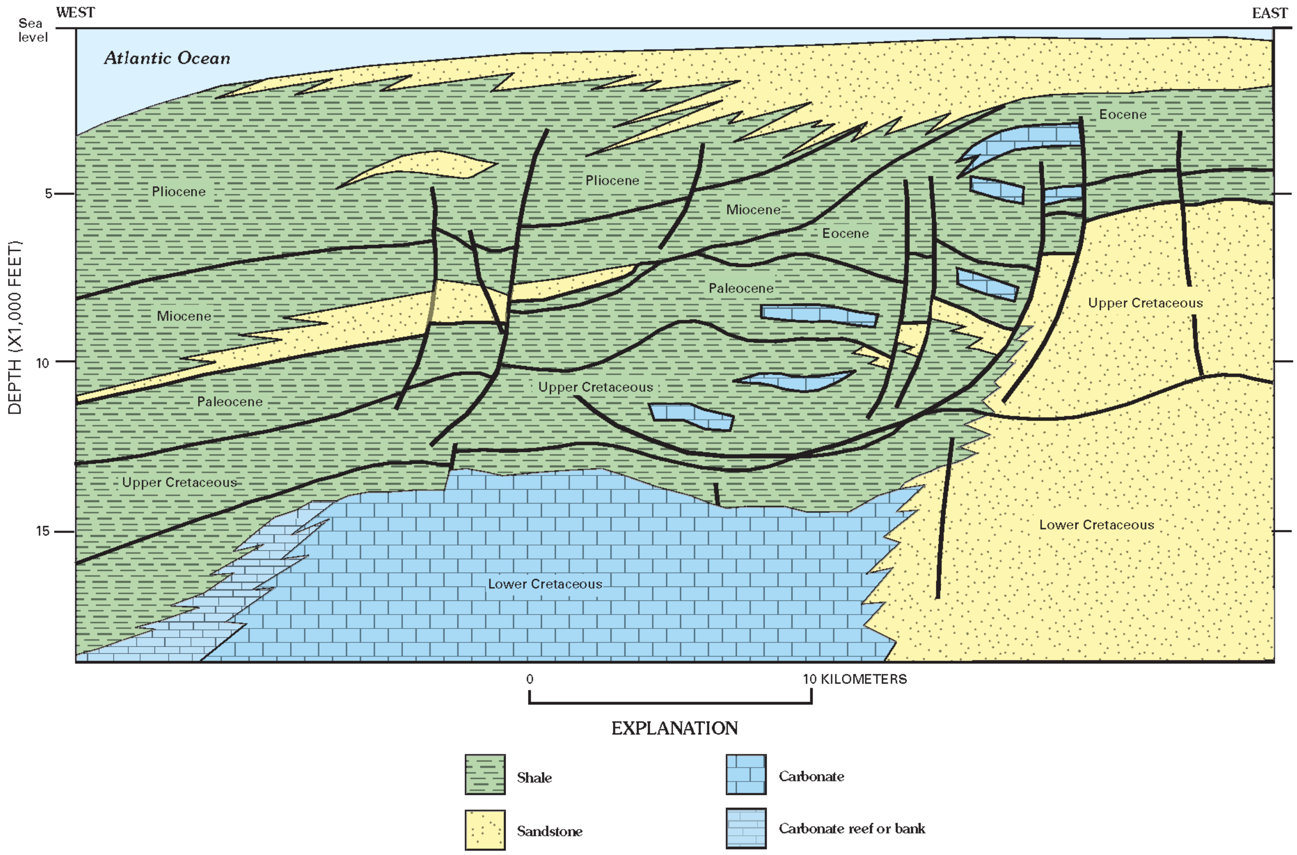

Figure 4. Schematic cross section showing the distribution of sedimentary facies in the Mauritania offshore, northern Senegal Basin, northwest Africa (From Brownfield and Charpentier, 2003).

4.2 SEDEX Pb-Zn (Ag) Deposits

The same tracts in the Taoudeni Basin that are considered permissive for MVT Pb-Zn-Ag deposits must also be considered permissive for SEDEX ores. The presence of stratiform Pb-Zn mineralized samples over a large area is characteristic of SEDEX ores. Furthermore, 22 percent of all SEDEX metals known on the Earth are hosted by carbonate units in clastic sedimentary sequences (Leach and others, 2005). However, the most critical attributes of SEDEX ores are their locations in tectonically active passive margin sequences dominated by shales or in continental rift basins. Neither of these attributes can be applied to the Taoudeni Basin.

The Coastal Basin could also be considered permissive for SEDEX deposits. As with MVT deposits, there are no recognized SEDEX deposits of Cenozoic age, so only the Mesozoic portion of the Coastal Basin could be considered permissive. The basin formed on a passive margin, and has recognized evaporite and shale sequences. However, these favorable units occur in the offshore portion of the basin, and there is little to no evidence to suggest the occurrence of subbasins that contain thick shale sequences in the onshore portion of the Coastal Basin (Brownfield and Charpentier, 2003; fig. 4).

There is moderate potential for SEDEX mineralization to have recently formed or to presently be forming offshore of Mauritania in the Coastal Basin area. This area contains 4 of the 7 global attributes for the occurrence of SEDEX ores given in section 3. Of particular importance is the presence of active seawater evaporation sites that generate the fluids capable of transporting lead and zinc and the presence of west facing passive margin sequences containing organic matter as reductants for seawater sulfate (Leach et al., 2005). SEDEX deposits form in subbasins where sedimentation rates are commonly very low, and where anoxic bottom water allows sulfide accumulation (Leach and others, 2005). However, the eastern Atlantic continental margin of northwest Africa, particularly between 15°N and 26°N, is characterized by to infrequent but large-scale mass movements that produce debris flows and turbidity currents (Weaver and others, 2000; Antobreh and Krastel, 2006, 2007). Therefore, even though the modern offshore coastal basin may have the appropriate chemical conditions to allow recent to present deposition of SEDEX mineralization, it appears to lack the appropriate sedimentary environment for this mineralization to accumulate and be preserved as significant deposits. Future work could evaluate whether the offshore region contains stable subbasins with low sedimentation rates where accumulation of SEDEX deposits may be favorable.

5 Conclusions

1. The sedimentary cover of the Taoudeni Basin with regionally extensive stromatolitic limestone and dolomitized limestones are permissive tracts for MVT deposits. Analogs to similar MVT deposits include the Pering and Bushy Park deposits of South Africa.
2. Favorable indications that these carbonates are permissive include the presence of evaporites, unconformities, proximal major orogenic belts, and mineral and geochemical occurrences that appear to be similar to MVT assemblages.
3. Late Neoproterozoic carbonate platforms that mark the first significant host for MVT deposits (located in South Africa) may be an analog for the Proterozoic carbonate platforms of Mauritania. If this is correct, a focus on faults and karst dissolution areas may be prospective.
4. Permissive tracts for SEDEX deposits coincide with the tracts indicated for MVT resources. However, the potential for SEDEX deposits is much less because the geodynamic model for the Taoudeni Basin differs from the geological settings that host world SEDEX deposits.
5. Available data suggest that the onshore Coastal Basin is unlikely to contain appropriate host rocks for MVT or SEDEX deposits, so based on current knowledge, this area cannot be considered permissive.

6 Acknowledgments

I thank David L. Leach, who prepared the preliminary version of this report, and John Horton, who prepared figure 1 and the plate that accompany this report. Al Hofstra and Andy M. Killick provided helpful and insightful reviews.

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