American Mineralogist, Volume 64, pages 464–467, 1979

NEW MINERAL NAMES*

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Bahianite*

P. B. Moore, C. do Prado Barbosa and R. V. Gaines (1978) Bahianite, $Sb_3Al_5O_{14}(OH)_2$, a new species. *Mineral. Mag., 42,* 179–182.

Bahianite occurs as water-worn pebbles ('favas') with quartz, andalusite, kyanite, diaspore, eskolaite, cassiterite, *etc.*, in the Paramirim region, south-central Bahia state, Brazil. The average of four wet-chemical and microprobe analyses gave Sb_2O_5 57.28, Al_2O_3 35.37, Fe_2O_3 1.04, WO_3 1.20, BeO 0.75, SiO_2 1.03, H_2O+ 2.77, sum 99.44%, leading to the formula for a series $Sb_3Al_5O_{14}(OH)_2$–$Sb_3Al_5(Al, Be, Si)_2O_{16}$. Bahianite is monoclinic, $a = 9.406(6)$, $b = 11.541(8)$, $c = 4.410(3)$A, $\beta = 99.94(3)°$, $Z = 2$, space group $C2/m$. Prominent powder diffraction lines are: 4.712(7)200, 3.241(10)$\bar{2}$01, 3.194(10)201, 2.457(7)240, 2.411(7)041, 2.156(8)$\bar{2}$41, 1.648(7)$\bar{2}$42, 1.635(7)242, 1.624(7)$\bar{4}$02. Color tan to cream, crystals in vugs colorless, tan or pale violet. Specific gravity ranges from 4.89 to 5.46 [5.26 for $Sb_3Al_5O_{14}(OH)_2$]; hardness 9, cleavage {100} perfect, luster adamantine, biaxial (−), $2V$ large, $\alpha = 1.81$, $\beta = 1.87$, $\gamma = 1.92$, $r > v$. The name is for the State of Bahia.

The crystal structure has been previously described; see P. B. Moore and T. Araki: Bahianite, $Al_5Sb_3^{5+}O_{14}(O,OH)_2$, a novel hexagonal close-packed oxide structure; *Neues Jahrb. Mineral. Abh., 126,* 113–125, 1976 (*Mineral. Abstr.,* 77-882). **A.P.**

Boyleite*

Kurt Walenta (1978) Boyleite, a new sulfate mineral from Kropbach, southern Black Forest. *Chem. Erde, 37,* 73–79 (in German).

Microchemical analysis by the Fresenius Laboratory gave SO_3 39.76, ZnO 29.25, MgO 2.82, CaO+H_2O (by difference) 28.17%. After deducting 11.6% gypsum, this corresponds to $(Zn_{0.84}Mg_{0.16})SO_4 \cdot 4H_2O$. Dissolved by water. Slowly dehydrates in a dry room to gunningite.

X-ray powder data are given (49 lines); strongest lines are 6.85(8)(011), 5.46(10)(110), 4.47(10)(120,111), 3.96(8)(002), 3.39(7)(040), 2.95(76)(140). These are very nearly the same as those published for $ZnSO_4 \cdot 4H_2O$ [Pannetier *et al., Bull. Soc. Chim.* (1966), 324–326], which leads to a monoclinic cell for boyleite, space group $P2_1/n$, $a = 5.95$, $b = 13.60$, $c = 7.96$A, $\beta = 90.4°$, $Z = 4$, G(calc) = 2.41.

Boyleite occurs as white earthy crusts formed by the decomposition of sphalerite. It is associated with gypsum. H near 2, fracture uneven. Optically biaxial, negative, $\alpha = 1.522 \pm 0.002$, $\beta = (1.531)$, $\gamma = 1.536 \pm 0.002$, $2V \sim 70°$.

The name is for R. W. Boyle, geochemist, Geological Survey of Canada. **M.F.**

Omeiite

Ren Yingxin, Hu Qinde and Xu Jingao (1978) A preliminary study on the new mineral of platinum group—omeiite, $OsAs_2$. *Acta Geol. Sinica, 52,* 163–167 (in Chinese with English abstract).

Microprobe analyses of six grains gave Os 47.7, 48.8, 48.3, 51.2, 50.7, 46.5; Ru 4.6, 4.4, 4.2, 3.5, 3.1, 4.2; Ir 0.6, 0.6, 1.1, 0.6, 0.5, 0.4; As 44.4, 44.5, 45.0, 44.2, 44.5, 42.3; Fe 0.2, 0.2, 0.2, 0.2, 0.2, 0.3; Co 0.1, 0.2, 0.1, 0.1, 0.1, 0.1; Ni 0.3, 0.3, 0.2, 0.2, 0.2, 0.4; sums 97.9, 99.0, 99.1, 100.0, 99.3, 94.2 wt%. The analyses correspond to

$$(Os_{0.85}Ru_{0.16}Ir_{0.01})_{\Sigma=1.02}As_2$$
$$(Os_{0.87}Ru_{0.15}Ir_{0.01})_{\Sigma=1.03}As_2$$
$$(Os_{0.85}Ru_{0.14}Ir_{0.02})_{\Sigma=1.01}As_2$$
$$(Os_{0.91}Ru_{0.12}Ir_{0.01})_{\Sigma=1.04}As_2$$
$$(Os_{0.90}Ru_{0.10}Ir_{0.01})_{\Sigma=1.01}As_2$$
$$(Os_{0.86}Ru_{0.15}Ir_{0.01})_{\Sigma=1.02}As_2$$

or ideally $OsAs_2$.

Precession and Weissenberg photographs show the mineral to be orthorhombic, $Pnnm$ or $Pnn2$. The cell constants $a = 5.409$, $b = 6.167$, $c = 3.021$A compare closely with those for synthetic $OsAs_2$ (Heyging and Calvert, *Can. J. Chem., 39,* 955–957, 1961); $Z = 2$, D(calc)11.20g/cm³. The strongest X-ray lines (38 given, including 3 β-lines) are: 4.06(6)(110), 2.67(8)(120), 2.63(10)(101), 2.04(6)(220), 2.01(6)(121), 1.915(10)(130,211), 1.209(6)(150,411).

Crystals are prismatic tabular (20 × 7μm), elongated along b. There is one cleavage parallel to elongation. The mineral is brittle, dull steel gray with a metallic luster. It polishes well. Under reflected light the mineral is white with a yellow tint in air, milky yellow in oil. It is distinctly anisotropic and weakly bireflectant, yellow to grayish yellow. Reflectances (R'_g and R'_p) are: 39.08, 37.86 (480); 40.43, 39.18 (546); 42.15, 42.06 (589); 46.35, 48.93% (656nm). The mineral is insoluble in HCl and HNO_3 and dissolves with difficulty in aqua regia.

The mineral occurs with sudburyite, antimonian michenerite, hexatestibiopanickelite (*Am. Mineral., 61,* 182, 1976), sperrylite, and kotulskite in a pyrrhotite–pentlandite–violarite–gersdorffite–chalcopyrite deposit associated with an altered ultramafic body in Sichuan (Szechuan), China. The name is for Omeishan, a well-known mountain in the province. Type specimens are preserved in the collections of the Museum of Geology, National Bureau of Geology (Peking?). **G.Y.C.**

Sasaite

J. Martini (1978) Sasaite, a new phosphate mineral from West Driefontein Cave, Transvaal, South Africa. *Mineral. Mag., 42,* 401–404.

Sasaite occurs as white chalky nodules in the soil of a dolomitic cave, apparently derived from the action of bat guano on clay minerals. It consists of an aggregation of rhombic plates 10-20 μm in greatest dimension. Wet-chemical analysis gave: Al_2O_3 21.65, Fe_2O_3 1.05, MnO 0.01, MgO 0.07, CaO 0.12, SrO 0.02, SO_3 2.77,

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* Minerals marked with asterisks were approved before publication by the Commission on New Minerals and Mineral Names of the International Mineralogical Commission.

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P_2O_5 24.16, H_2O 49.50, F 0.03, insol. 0.07, sum (less O for F) 99.44 percent, leading to the simplified formula $(Al,Fe^{3+})_{14}(PO_4)_{11}(OH)_7SO_4 \cdot 83H_2O$. A diffractometer pattern has been indexed on the basis of an orthorhombic cell with a = 21.50, b = 30.04, c = 92.06A, Z = 10, G(calc) 1.747, (meas) 1.75. Principal lines of the powder pattern are: 11.52 100, 7.51 22, 6.99 23, 6.30 21, 2.901 42. Refractive indices are α = 1.465, β = 1.473, γ = 1.477. At ambient temperature sasaite loses water rapidly, about 12% of total weight in ordinary atmosphere, 22% in a silica-gel desiccator. After two weeks it hydrates entirely again in a water-saturated atmosphere. The name is derived from South Africa Speleological Association, the members of which explored West Driefontein Cave for the first time and discovered the mineral. **A.P.**

Tlapallite*

S. A. Williams and Marjorie Duggan (1978) Tlapallite, a new mineral from Moctezuma, Sonora, Mexico. *Mineral. Mag., 42,* 183–186.

Tlapallite was first recognized as a new mineral in 1972 at the Bambollita (La Oriental) mine near Moctezuma, where it occurs as thin paint-like films on rock fractures in and adjacent to thin veins cutting intensely sericitized rhyolites. Recently it has also been found in old specimens from Tombstone, Arizona. Data for type (Mexican) material: color viridian green RHS-128A with pale streak, H = 3, D(calc) 5.05 g/cm³; monoclinic, class unknown, indexing of powder pattern based on Ito method gave a cell a = 11.97, b = 9.11, c = 15.66A, β = 90°36′. Strongest powder diffraction lines: 11.972(10)100; 2.985(10)313,22$\bar{3}$; 3.540(6) 302,22$\bar{1}$,311; 5.946(5)012; 2.887(5)13$\bar{1}$,131,11$\bar{5}$,12$\bar{4}$. Similar data were obtained for the Tombstone material, which also yielded a better analysis: CaO 4.3, PbO 13.6, CuO 15.8, ZnO 0.7, TeO_2 44.3, TeO_3 12.5, SO_3 5.57, H_2O 4.25, sum 101.02%, leading to the formula $H_6(Ca,Pb)_2(Cu,Zn)_3(SO_4)(TeO_3)_4(TeO_6)$; for Z = 4 G(calc) = 5.465, G(meas) = 5.38. Characterized by extreme birefringence; for Mexico α = 1.815, β = γ = 1.960, for Tombstone α = 1.915, β = γ = 2.115. The name is taken from the Nahua word tlapalli, meaning paint, in allusion to the mode of occurrence. **A.P.**

Tučekite*

J. Just and C. E. Feather (1978) Tučekite, a new antimony analogue of hauchecornite. *Mineral. Mag., 42,* 278, M21–22.

Tučekite, $Ni_9Sb_2S_8$, was found as microscopic grains in a mineralized Archean chlorite schist at Kanowna, Western Australia, and in gold-bearing conglomerates from at least two localities of the Witwatersrand System, South Africa. At Kanowna tučekite occurs as rims and irregular grains partly replacing millerite and is associated with pyrite, chalcopyrite, gersdorffite, pentlandite, magnetite, and supergene polydymite. In the Witwatersrand the mineral was found in concentrates as rare free grains or intergrown with gold or with gersdorffite. The mineral is opaque, pale yellow, with metallic luster. Under the microscope in reflected light it is pale brownish-yellow; reflectivity high. Indentation hardness 718 kg/mm² (20 g load); 417 kg/mm² (10 g load). Best microprobe analysis from Kanowna gave: Ni 47.34, Co 1.06, Fe 3.61, As 0.86, Sb 21.62, Te 0.30, Bi 1.84, S 25.19, sum 101.81%, and the average of several microprobe analyses of material from Witwatersrand gave: Ni 47.80, Fe 3.75, As 1.34, Sb 21.87, Bi 1.02, S 25.13, sum 100.91%. A powder pattern of tučekite from Witwatersrand, indexed by analogy with hauchecornite, gave the tetragonal cell dimensions a = 7.174, c = 5.402A; D (calc) = 6.15 g/cm³ with Z = 1. The name is in honor of Dr. Karel Tuček, Curator of Minerals at the National Museum in Prague, Czechoslovakia. **A.P.**

Uranospathite and arsenuranospathite

K. Walenta (1978) Uranospathite and arsenuranospathite. *Mineral. Mag., 42,* 117–128.

Reinvestigation of uranospathite from the type locality, Redruth, Cornwall (Hallimond, *Mineral. Mag., 17,* 221–236, 1915) shows that it is an aluminum uranyl phosphate belonging to the torbernite series but more highly hydrated than other members thereof. The composition $(HAl)_{0.5}(UO_2)_2(PO_4)_2 \cdot 20H_2O$ was derived by indirect methods and from a microprobe analysis showing 2.6% Al_2O_3 in partly dehydrated material.

Arsenian uranospathite occurs at Menzenschwand in the southern Black Forest. Arsenuranospathite proper is a new mineral found at Menzenschwand and also at Wittichen in the central Black Forest. It is the aluminum uranyl arsenate corresponding in formula to uranospathite. It is found in white to pale yellow lathlike or wedge-shaped crystals of orthorhombic habit with perfect {001} cleavage and good {100} and {010} cleavages.

Though both minerals are biaxial negative, and this is presumably the reason for reference to {100} and {010} cleavages, they are assigned to a tetragonal space group, $P4_2/n$. For uranospathite: a = 7.02, c = 30.02A, Z = 2; D (calc) = 2.49 g/cm³; α = 1.492(2), β = 1.511(2), γ = 1.521(2), $2V(-)$ = 76°; for arsenuranospathite: a = 7.16, c = 30.37A, Z = 2, D (calc) = 2.54 g/cm³; β = 1.538, γ = 1.542(3), $2V(-)$ = 52°. Both minerals convert readily to a lower hydrate, that in the case of partly dehydrated uranospathite is identical with sabugalite. Cell dimensions for the lower hydrate formed from arsenuranospathite, with $10H_2O$ per formula unit as here stated, are a = 7.15, c = 20.52A, Z = 2, D (calc) = 3.20 g/cm³; α = 1.564 colorless, β = 1.594, γ = 1.596 yellowish, $2V$ *ca.* 28°. The designations arsenuranospathite I, II, and III are proposed for the 20, 16, and $10H_2O$ hydrates, the $16H_2O$ hydrate being known only as a synthetic product. **A.P.**

Whiteite*

Paul Brian Moore and Jun Ito (1978) I. Whiteite, a new species, and a proposed nomenclature for the jahnsite–whiteite complex series. II. New data on xanthoxenite. III. Salmonsite discredited. *Mineral. Mag., 42,* 309–323.

Whiteite occurs with other phosphates along joints and fractures in quartz and albite on numerous specimens from Ilha de Taquaral, Minas Gerais, Brazil, in crystals up to 2cm. Rather pure material also occurs in a sideritic iron-formation in the Fish River–Blow River area of NE Yukon Territory. Analysis of the Yukon whiteite yielded Na_2O 0.17, CaO 5.98, MgO 12.55, MnO 0.45, FeO 9.57, Al_2O_3 11.54, Fe_2O_3 0.25, P_2O_5 37.68, H_2O- 10.35, H_2O+ 11.21, sum 99.75 percent, leading to the formula $Ca(Fe,Mn)^{2+}Mg_2Al_2(OH)_2(H_2O)_8(PO_4)_4$. Analyses are also reported for Ca-poor and for Mn-rich types of whiteite. Whiteite crystallizes in the space group $P2_1/a$; cell dimensions for that from Minas Gerais are: a = 14.90(4), b = 6.98(2), c = 10.13(2)A, β = 113°07(10)′, Z = 2; G = 2.58; strongest lines in the powder diffraction pattern are: 9.270(100)001; 4.822(65)111; 4.657(65)002; 2.941(70)$\bar{4}$03; 2.781 (80)022. The crystals are tan colored; refractive indices are: α = 1.580(3), β = 1.585(3), γ = 1.590(3); $2V(+)$ = 40–50°, $X \parallel b$,

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Y || *a*. Properties of Ca-poor whiteite differ but slightly. The name is for Mr. John S. White, Jr. of the Smithsonian Institution.

Whiteite is the Al^{3+}-analogue of jahnsite, and the following nomenclature is proposed on the basis of site occupancies in the structure: $XM(1)M(2)_2M(3)_2(OH)_2(H_2O)_8(PO_4)_4$, whiteite if $Al^{3+} > Fe^{3+}$ in *M*(3) and jahnsite if $Fe^{3+} > Al^{3+}$ in *M*(3). Established approaches to end-member compositions include: whiteite—($CaFe^{2+}Mg$) (type), whiteite—($Mn^{2+}Fe^{2+}Mg$), jahnsite—($CaMn^{2+}Mg$) (type), jahnsite—($CaMn^{2+}Fe^{2+}$) (Fletcher, N. H.), and possibly jahnsite—($Mn^{2+}Mn^{2+}Mn^{2+}$) (Pala). **A.P.**

Discussion

The indices of refraction (measured to ±0.003 on zoned material) are those of a biaxial, negative mineral with large 2*V*. **M.F.**

Xiangjiangite

Hunan 230 Institute and X-ray Laboratory, Wuhan Geologic College (1978) Xiangjiangite—a new uranium mineral discovered in China. *Sci. Geol. Sinica, No. 2,* 183–188 (in Chinese with English abstract).

Chemical analysis, before and after deduction of insolubles and admixed quartz and pyrite, gave UO_3 56.24, 59.96; Al_2O_3 0.90, 0.96; Fe_2O_3 2.04, 2.17; CaO 0.26, 0.28; P_2O_5 8.15, 8.69; SO_3 5.65, 6.02; H_2O^+ 9.86, 10.51; H_2O^- 10.70, 11.41; SiO_2(quartz) 4.42, –; Fe(pyrite) 0.15; –; S(pyrite) 0.20, –; As_2O_3 0.13, –; insol 0.46, –; sums 99.16, 100.00 wt%. The analysis corresponds to $(Fe_{0.52}Al_{0.39})(UO_2)_4(PO_4)_{2.34}(SO_4)_{1.44}(OH)_{0.95} \cdot 22.79H_2O$ ($Ca_{0.10}$ omitted, GYC) or simply $(Fe,Al)(UO_2)_4(PO_4)_2(SO_4)_2(OH) \cdot 22H_2O$. Semi-quantitative spectrographic and microprobe analyses confirmed the presence of U, P, Fe, and Al. $Z = 1$, D (calc) = 2.87, (meas) = 2.9–3.1g/cm³.

The powder diffraction pattern is indexable on a tetragonal cell with $a = 7.17$, $c = 22.22$A. The *hk*0 electron diffraction photograph shows the absence of a four-fold axis, and the true symmetry is therefore monoclinic, or more likely orthorhombic. The strongest X-ray lines (29 given) are: 11.11(10)(002), 5.58(5)(004), 4.621(6)(112), 3.74(8)(114), 3.294(8)(106), 2.938(7)(213), 2.175(5)(313), 2.074(5)(226). Material dehydrated at 100°C gives a significantly different pattern with strongest lines 4.45(10), 2.86(8), 2.18(7), 2.08(8), 1.771(7), 1.685(6), 1.539(6), 1.250(6).

The mineral occurs as yellow to bright yellow earthy microcrystalline aggregates. The streak is pale yellow and luster silky. The mineral dissolves readily in dilute HCl and H_2SO_4. It is not fluorescent in short-wave UV radiation. H = 1–2. Under electron microscope most crystals appear as stretched six-sided plates with approximately 90° and 135° interfacial angles; some appear as eight-sided and rectangular plates. Optically the mineral is biaxial negative, $\alpha = 1.558$, $\beta = 1.576$, $\gamma = 1.593$. Pleochroism weak, extinction parallel or symmetrical.

The infrared spectrum is essentially similar to that of torbernite, autunite, and furongite (*Am. Mineral., 63,* 425, 1978) but with additional weak bands. The DTA curve shows endothermic breaks at 95°(vs), 174°(m), 217°(m), 330°(w), and 754°(w) and an exothermic break at 990°C(w). The TGA curve shows a major weight loss between 95° and 477°C and a minor weight loss at near 754°C.

The mineral occurs with sabugalite, variscite, pyrite, and quartz in the oxidized zone of a Permian uranium deposit in Hunan, China. The name is for the river Xiangjiang or Hsiang River. **G.Y.C.**

Discussion

The strongest X-ray lines given in the English abstract [11.11(10), 5.58(8), 4.621(6), 4.119(6), 3.743(8), 3.313(8), 2.96(7), 2.179(5), 2.063(5)] are not consistent with those given in Table 2 of the text. The calculated density (2.87) and the number of Al (0.39) in the given empirical formula are in error, and should be 2.775 and 0.36 respectively. The analysis may be recalculated, on the basis of 49 cationic charges, to $(Fe_{0.54}Al_{0.37}Ca_{0.10})(UO_2)_{4.16}(PO_4)_{2.43}(SO_4)_{1.49}(OH)_{0.98} \cdot 23.65H_2O$. The density calculated from this formula, 2.88g/cm³, is more in line with the observed values, 2.9–3.1g/cm³. The fact that the sum of P and S atoms approaches 4 per formula suggests an unusual substitutional relationship between P and S. The balancing of charges is probably accomplished by varying the amount of OH present. The generalized formula may be written as $(Fe,Al)(UO_2)_4(PO_4)_{2-3}(SO_4)_{2-1}(OH)_{1-0} \cdot 24H_2O$. **G.Y.C.**

NEW DATA

Xanthoxenite

Paul Brian Moore and Jun Ito (1978) I. Whiteite, a new species and a proposed nomenclature for the jahnsite–whiteite complex series. II. New data on xanthoxenite. III. Salmonsite discredited. *Mineral. Mag., 42.* 309–323.

The mineral named xanthoxenite by Laubmann and Steinmetz (*Z. Kristallogr., 55,* 523–585, 1920), authentic examples of which cannot be located, is probably stewartite (in part) on the basis of morphological, optical, physical, and paragenetic evidence. It is proposed that the xanthoxenite of Frondel (*Am. Mineral., 34,* 692–705, 1949) from the Palermo No. 1 mine, North Groton, New Hampshire, be adopted as the specific term and that his material be defined as the neotype, having the probable composition $Ca_4Fe_2^{3+}(OH)_2(H_2O)_3(PO_4)_4$. **A.P.**

DISCREDITED MINERALS

Dehrnite and lewistonite = Carbonate-fluorapatite*

Pete J. Dunn (1978) Dehrnite and lewistonite: discredited. *Mineral. Mag., 42,* 282–284.

X-ray and microprobe examination of type dehrnite from Dehrn, Germany, and of dehrnite from Fairfield, Utah, shows this mineral to be a carbonate-fluorapatite. Similar examination of the apatite mineral labelled *englishite-analyzed* (from the Harvard collection, but presumably interchanged with Fairfield "lewistonite") and of seven topotype "lewistonites" indicates that they, too, are carbonate-apatite.

The sodium and potassium content originally reported for dehrnite and lewistonite is now attributed to contaminants. **A.P.**

Salmonsite = Hureaulite + jahnsite

Paul Brian Moore and Jun Ito (1978) I. Whiteite, a new species, and a proposed nomenclature for the jahnsite-whiteite complex series. II. New data on xanthoxenite. III. Salmonsite discredited. *Mineral. Mag., 42,* 309–323.

W. T. Schaller described salmonsite as a new mineral from the Stewart mine, Pala, San Diego County, California (*J. Wash. Acad. Sci., 2,* 143–145, 1912). His type material cannot be located, but salmonsite from the same locality examined by D. J. Fisher (*Am.*

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Mineral., *43*, 181–207, 1958) matches exactly the description given by Schaller. X-ray powder diffraction patterns of this material can be completely interpreted in terms of a mixture of hureaulite and jahnsite. The chemical analysis by Schaller is also nicely interpreted in terms of 53.2% manganian jahnsite, 45.4% hureaulite, and 1.4% insoluble. **A.P.**

Clay Minerals Society Meeting

The sixteenth meeting of the Clay Minerals Society and the 28th Annual Minerals Conference will be held on August 26-29, 1979, at Macon, Georgia. Three days of technical sessions including a symposium on kaolinite processing are currently planned. A two-day field trip is planned with visits to the kaolin mines and processing plants of middle Georgia on Thursday, August 29, and the attapulgite -- Andersonville area on Friday, August 30. Explanatory titles of papers are due by May 1, 1979, and the deadline for abstracts is June 1, 1979. Submit titles to

Dr. C. E. Weaver
Technical Program Chairman
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The 1980 Clay Mineral Conference will be held in Waco, Texas, on October 5-8. Dr. J. L. McAtee will be the General Chairman of the 1980 Conference.

MSA Short Course on Marine Minerals

A Short Course on Marine Minerals, sponsored by the Mineralogical Society of America, will be held at La Jolla, California, during November 2-3, 1979. It precedes the annual meetings of the Geological Society of America and associated societies in San Diego during November 5-8, 1979. Lectures, demonstrations, and exhibits are planned on the following marine minerals: phosphorite, barite, evaporites, silica polymorphs, zeolites, clays, placer deposits, iron oxides, manganese oxides, and ferromanganese deposits. The purpose of the Short Course is to provide an overview of the mineralogy, geochemistry, paragenesis, and economic potential of minerals on the seafloor or in the ocean.

Further information and registration forms may be obtained from: Roger G. Burns
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