THE DEPARTMENT OF ENVIRONMENTAL QUALITY

mississippi geology

Office of Geology
P. O. Box 20307
Jackson, Mississippi 39289-1307

Volume 18, Number 1
March 1997

HOW MUCH DO WE CONSUME?

George S. Austin
Senior Industrial Minerals Geologist
New Mexico Bureau of Mines and Mineral Resources
Socorro, New Mexico

Each year every American consumes flour and other foods, soda pop, shoes, and gasoline, to mention only a few items. We consume these items by various means: we *eat* the flour in bread, *drink* soda pop, *wear* out shoes, and *burn* gasoline. Each of us also consumes, or uses, large amounts of earth materials—although they are consumed in different ways than food or clothing. When we drive on the highway, we are using a road that was constructed of either concrete or bituminous pavement, both of which contain aggregate composed of crushed stone, sand, and gravel. When we are at school or the office, we are using a building that was constructed of earth materials, mostly of aggregate and cement. As these roads and

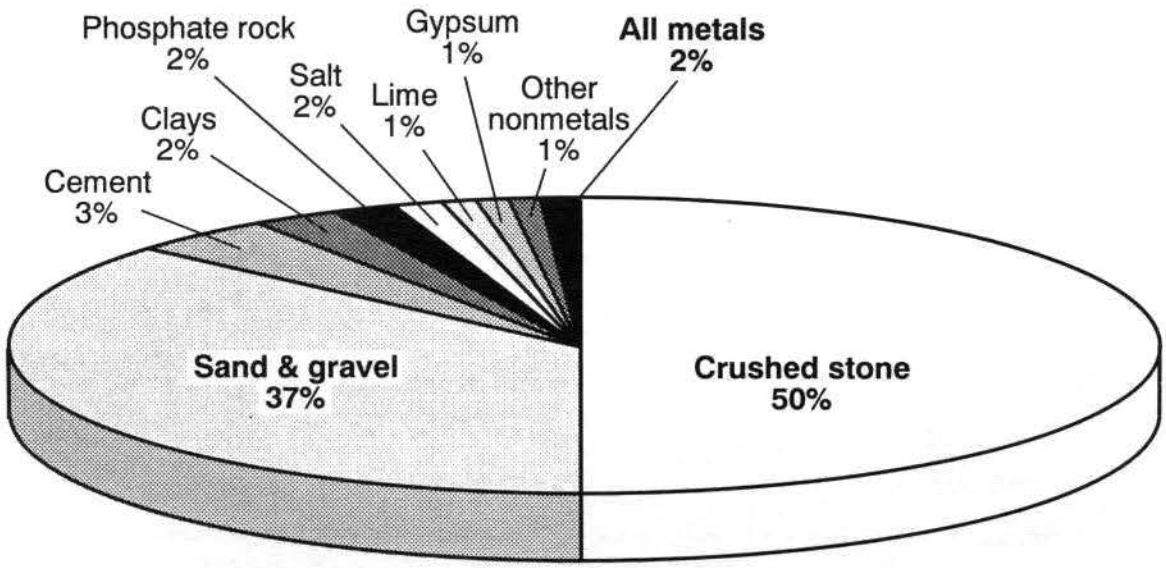


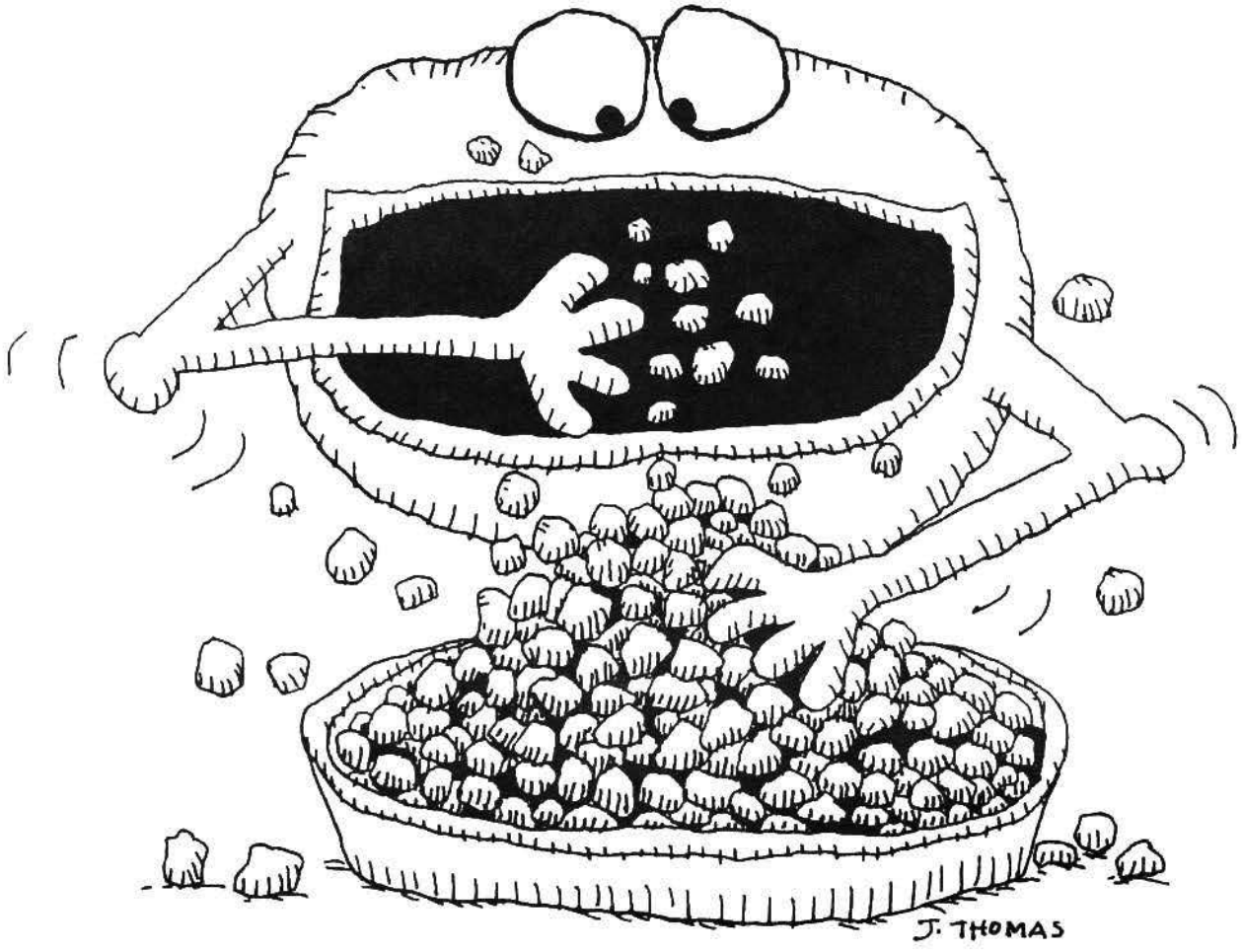
Figure 1. Total U.S. mineral production in tonnage in 1994 by percent (U.S. Department of the Interior, 1996).

structures deteriorate, they must be maintained, which means they will be refitted or replaced after a finite length of time. New ones also must be built to keep up with the increasing population.

How much earth materials are used in the United States every year? According to the U.S. Department of the Interior, the total weight of nonfuel minerals produced in this country in 1994 was more than 2.7 billion tons! This is a tremendous amount, but can we understand how large an amount 2.7 billion tons really is? Let's figure out how many pounds or tons of nonfuel minerals each person uses in one year.

On the Internet, the U.S. Bureau of the Census reports that the United States population in 1994 was estimated to be 260,651,000 (U.S. Bureau of the Census, 1996). If we divide the 2.7 billion tons (actually 2,713,799,694 tons) by 260,651,000, our answer is 10.41 tons. That is more than 10 tons of earth material that every man, woman, and child uses per year! If we break down that number into metals and nonmetals, we get 2% metals and 98% nonmetals (Figure 1). We can break down the nonmetals further:

	lbs.
Crushed stone	**10,400**
Sand and gravel	**7,764**
Cement	**629**
Clays	**356**
Phosphate rock	**348**
Salt	**333**
Lime	**148**
Gypsum	**145**
Other nonmetal minerals	**187**
All metals	**510**
TOTAL	**20,820 lbs (or 10.41 tons)**



The *all metals* category includes the ones with which we are so familiar—iron, copper, and aluminum.

The commodity totals listed above are only for earth materials produced in the United States. If we consider imported goods, our consumption of earth materials is even larger! Some aggregate used in the United States is from Canada and Mexico, but we probably export to them nearly the same amount. However, we are totally reliant on foreign sources for some minerals—such as bauxite as a source of aluminum.

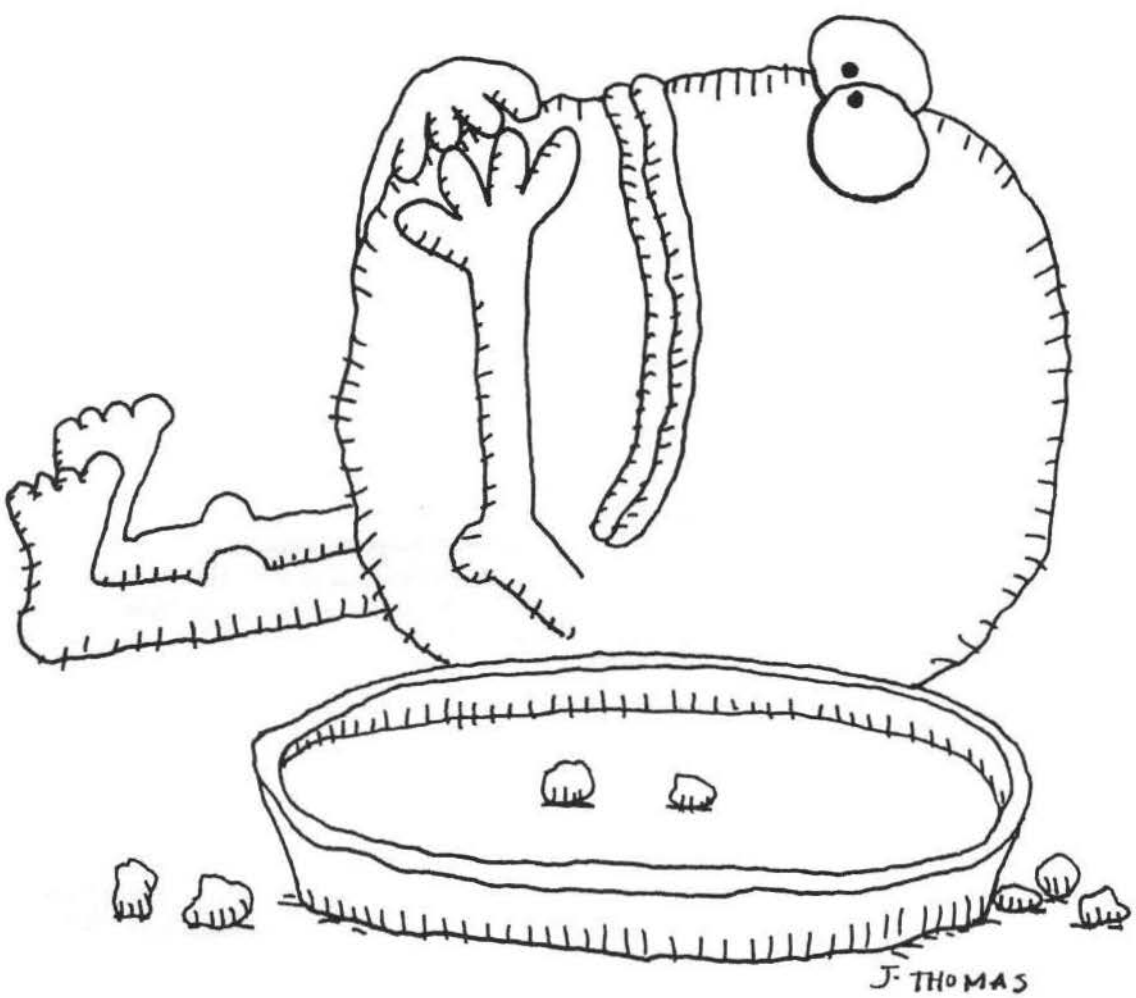
Fortunately, our individual share of mineral production is decreasing somewhat. Similar calculations for back in 1980 by Bates and Jackson (1982) indicated that the average citizen consumed about 11 tons of earth materials each year. Still, the United States population in 1980 was 227,726,000 compared to 260,651,000 in 1994 (U.S. Bureau of the Census, 1996). In 1980 at 11 tons per person, the total U.S. nonfuel mineral production was 2.5 billion tons. The total rose to 2.7 billion tons because our population continues to rise. What will the total mineral production be in the United States in 10 years? What do you think your *share* will be?

References

Bates, R. L., and Jackson, J. A., 1982, Our modern stone world: William Kauffman, Inc., Los Altos, California, 135 pp.

U.S. Department of the Interior, 1996, Mineral industry surveys, Statistical summary: U.S. Department of the Interior, Bureau of Mines, 22 pp., available via Mines Faxback (accessed June 6, 1996).

U.S. Bureau of the Census, Current population reports, P25-311, P25-802, P25-1045, and P25-1126 online, U.S. Department of Commerce, available <http://www.census.gov/ftp/pub/statab/freq/95s0002.txt> (accessed June 6, 1996).



Reprinted with permission from the New Mexico Bureau of Mines and Mineral Resources (Austin, G. S., 1996, How much do we consume?: Lite Geology, Summer, 1996, p. 7-8); the artwork is by Jan Thomas.

BILOXI SANDS AND THE BILOXI FORMATION—A FOOTNOTE IN "STRATIGRAPHIC ARCHEOLOGY"

Ervin G. Otvos
Gulf Coast Research Laboratory
USM Institute of Marine Sciences
Ocean Springs, MS 39566-7000

The Late Pleistocene Biloxi Formation, a transgressive-regressive unit, deposited in a seaward succession of brackish estuarine-inshore to open marine inner shelf facies is associated with the Sangamonian Interglacial (Oxygen Isotope Stage 5) marine highstand. It was originally reported from numerous drillcores in the shallow coastal subsurface and also observed in a very few man-made and natural outcrops (Otvos, 1972, 1985, 1991). The Biloxi was first described from engineering drillcores drilled immediately west and southwest of Keesler Air Force Base in residential subdivisions of Biloxi. It is among the very few stratigraphic entities that, after having been described first in Mississippi, was correlated with coastal plain sequences in the rest of the five Gulf states as well.

This unit overlies older Pleistocene or Late Neogene clastics and, in turn, is overlain by Late Pleistocene coastal barrier and alluvial deposits (the Gulfport and Prairie formations and, in Texas, their correlatives). On the Mississippi coast it consists generally of fossil-rich, medium bluish-gray (5B 5/1), light gray (N 7), and medium greenish-gray (5 GY 5/1) and dark greenish-gray (5 G 4/1) muddy fine sands, clayey fine sands and sandy muds. In Mississippi and Alabama the sand content ranges between 13 to 66%. While the formation here usually is not more than 5 to 15 m thick, the Biloxi exceeds 35 to 45 m in Florida's Apalachicola delta region where it is dominantly of sandy composition (Otvos, 1992).

After first formally describing the Biloxi Formation on the Mississippi coast, it was brought to my attention that a name, "Biloxi sand" or rather, "sands", had been used in the same area in the early geological literature. This rather informal early use has been noted (Otvos, 1975). The name was cataloged in a lexicon of geological designations as a term not adopted by the U.S. Geological Survey. This Lexicon also lists miner's terms, trade and other names, many not used by geologists (Keroher et al., 1966, p. 344). Childress (1973) in a State Survey publication cited four references to this early geological designation prior to 1925, under the heading of the Biloxi Formation.

During the 1997 meeting of the Mississippi Academy of Sciences in Biloxi the presentation by David T. Dockery and a brief discussion dealt with a proposed new stratigraphic table of the state. Debate arose about the nature and background of the earlier "Biloxi" designation and the possible priority of the term, if valid.

While discussing the "Biloxi sands" in a rambling, quaint, but charming style, common in nineteenth century geological publications, Johnson (1891, p. 24) places these fossiliferous sands mostly in the Holocene, and to a lesser extent into what amount to Pleistocene units. Johnson's remarks strike one as an afterthought near the end of a short report that dealt mostly with the geological and biological impact of a major Mississippi River flood event in the Lake Pontchartrain basin.

Johnson included an 80 to 100 ft interval in his "Biloxi sands" in borings at Pass Christian, Biloxi, and the mouth of Pearl River. In an endlessly rambling later report that repeats Johnson's earlier thoughts, Smith et al. (1894, p. 28-36), under the heading "Gulf coast formations (Biloxi), in part Recent," include the top 350 ft interval, encountered in Biloxi artesian wells drilled for fishing industry and canning plants, among their Biloxi beds. "Provisionally, then, and for the sake of convenience, we have applied the name Biloxi to the Coast formations, as they appear along this part of the Gulf." Johnson's idea in defining a "formation" can not be compared with the present designation of litho- or biostratigraphic units, conforming to the present code that evolved slowly since the early days.

Johnson describes the "Biloxi sands" as forming a strip, zero to several miles wide, that previously extended seaward beyond the present barrier island chain. In Johnson's view, these deposits occur immediately landward of the Mississippi Sound, between the Rigolets Pass in southeastern Louisiana or the mouth of Pearl River between the two states, on one hand, and Mobile Bay, on the other. One is left without clues in attempting to interpret what the distribution area of Johnson's Biloxi sands was supposed to be. The north-south width of the combined Holocene and Pleistocene lowlands on the Mississippi-Alabama coastal plain is at least three miles. Along Pearl River and Mobile Bay the width exceeds 20-30 miles. According to Johnson (1891), "in geologic age" the Biloxi sand beds that alternate with yellowish-brown and blue clays "represent the beginning of the present or the close of the past. These beds were unquestionably formed after the mouth of the great river pushed beyond the highlands of Baton Rouge and then the passes were probably about where New Orleans now

stands around the great Crescent bend."

Probably for lack of macrofossils in the wells studied, Johnson did not identify "Biloxi sands" at Ocean Springs. Based on the meager information available to him from the coastal water wells, Johnson did not realize that the Holocene, Pleistocene and Pliocene units are clearly defined, discrete entities and that the global late Pleistocene regression played a decisive role in separating the Pleistocene and Holocene units.

Instead, he stated, "It will be seen that the practical continuity of these deposits make it impossible to draw any sharp lines of demarkation between the two time divisions into which they must fall, and we shall therefore speak of them together." Interestingly, successive generations of the Sutter family, owners of the by now defunct Pass Christian well drilling company, provided information to L. C. Johnson, G. F. Brown, and in the early 1970s, drilling expertise for our Gulf Coast Research Laboratory shallow core drilling program.

Following Johnson's short paper, Lowe (1915, p. 93; 1925, pp. 81, 96; and 1930, p. 80-81) referred as "Biloxi beds" to a "marine phase" of shallow sediments, located beneath the town of Biloxi. This phase consists of alternating beds of dense gray and blue clays and sands that extend to a maximum depth of about 300 ft. The sand intervals represent artesian aquifers, already a major supplier of ground water to the Mississippi Coast. Without any explanation, the top 100 ft of the "Biloxi beds" in one 200-ft city water well was assigned to the Recent (Holocene); the lower 100 ft, to the Pleistocene Epoch. Lowe (1930, p. 81) also speculated that the deposition of the Biloxi beds continued uninterrupted to the present day. No mention is made here of the regional extent of the "Biloxi beds."

Lowe's description clearly indicates that except for the highest interval, his "Pleistocene and Recent Biloxi beds" that produce artesian ground water correspond to the upper portion of the late Neogene aquifer sequence that later Brown et al. (1944) assigned to the "Graham Ferry Formation." That interval, its Pliocene age recently for the first time confirmed by fossil data, consists of alternating sands and clays, alluvial fresh water and low salinity fossiliferous deposits (Otvos, 1985). Except for recent dunes of Mississippi Sound beaches, there are no supratidal Holocene deposits along the mainland shore. Only a very small fraction, the top approximately 30-50 feet of the 350 ft thick "Biloxi sand(s)"—"Biloxi beds" interval generally consists of Pleistocene units; usually, but not always the Biloxi Formation and, where present, barrier sands of the overlying Gulfport Formation (Otvos, 1975).

The loosely defined terms of Biloxi sands or Biloxi beds, disregarded even by Brown and his coauthors in the first comprehensive geological treatment of the Mississippi coast, have been superseded by proper stratigraphic designations. The ambiguous and indeed fanciful applications of these names, never utilized in geological studies since Johnson's 1891 report and long ago forgotten, should not prevent the use of the Biloxi location name to be a part of a stratigraphic designation that fully conforms with the strict standards of the modern era.

REFERENCES CITED

Brown, G. F., V. M. Foster, R. W. Adams, E. W. Reed, and H. D. Padgett, Jr., 1944, Geology and ground-water resources of the coastal area in Mississippi: Mississippi Geological Survey, Bulletin 60, 232 p.

Childress, S. C., 1973, Mississippi geologic names: Mississippi Geological Survey, Bulletin 118, 172 p.

Johnson, L. C., 1891, The Nita Crevasse, p. 20-25, *in* Proceedings of the Semiannual Meeting held at Indianapolis, August 19, 1890: Geological Society of America Bulletin, v. 2, p. 1-30.

Keroher, G. C., et al., 1966, Lexicon of geological names of the United States for 1936-1960, Part I: U.S. Geological Survey, Bulletin 1200, 1448 p.

Lowe, E. N., 1915, Mississippi, its geology, geography, soils and mineral resources: Mississippi Geological Survey, Bulletin 12, p. 93.

Lowe, E. N., 1925, Geology and mineral resources of Mississippi: Mississippi Geological Survey, Bulletin 20, 140 p.

Lowe, E. N., 1930, Geology of the Mississippi Gulf Coast: Proceed. Annual Meeting, American Shore and Beach Preservation Association, December 1929, p. 77-88.

Otvos, E. G., 1972, Pre-Sangamon beach ridges along the northeastern Gulf Coast-fact or fiction?: Gulf Coast Association of Geological Societies, Transactions, v. 22, p. 223-228.

Otvos, E. G., 1975, Late Pleistocene transgressive unit (Biloxi Formation), northern Gulf coast: American Association of Petroleum Geologists Bulletin, v. 59, no. 1, p. 148-154.

Otvos, E. G., 1985, Coastal Evolution - Louisiana to Northwest Florida: New Orleans Geological Society, Guidebook, 92 p.

Otvos, E. G., 1991, Northeastern Gulf Coast Quaternary *in* R. B. Morrison and others, editors, Quaternary nonglacial geology: Geological Society of America, Decade of North American Geology, v. K-2, p. 588-595, 605-610.

Otvos, E. G., 1992, Quaternary evolution of the Apalachicola Coast, northeastern Gulf of Mexico: Quaternary Coasts of the United States, SEPM Special Publication 48, p. 221-232.

Smith, E. A., L. C. Johnson, and D. W. Langdon, Jr., 1894, Report on the geology of the Coastal Plain of Alabama: Geological Survey of Alabama, Special Report 6, 759 p.

DEQ GEOLOGY WORKSHOPS FOR SCIENCE TEACHERS

David T. Dockery III
Mississippi Office of Geology

The idea of geology workshops for science teachers, as a joint venture of the Mississippi Department of Environmental Quality (DEQ) and the Mississippi Department of Education, was the conception of Eleana Turner, then in charge of DEQ Public Relations. According to Turner, the idea developed when she observed several publications on fossils by the Mississippi Office of Geology featured in the December 1994 issue of *American Conchologist* (Scheu, 1994), a well-illustrated popular journal for shell collectors. Turner's surprise at the broad interest in the state's fossils aroused the thought of utilizing DEQ expertise in sponsoring science-teacher workshops.

Turner's idea of teacher workshops as an outreach of the Public Relations Division (Office of Administrative Services) was new but was not the first educational outreach by DEQ. In December of 1993, DEQ's Office of Pollution Control (OPC) began offering Adopt-A-Stream volunteer monitoring workshops. Adopt-A-Stream workshops in 1995 offered 2 continuing education unit (CEU) credits for teachers and, in 1997, will offer 3 CEU credits. In June of 1993, under the direction of Laura Beiser, OPC became a sponsor for a series of workshops entitled Project Earth Environmental Education Workshops for Teachers. These week-long workshops concerned environmental

Figure 1. John Davis of St. Andrew's Middle School identifying rocks and answering teachers' questions.

issues such as recycling and emphasized aquatic environments and, on June 25, 1996, added a section in geology. The Project Earth Workshop series offered 3 CEU credits as well as college credits for teachers.

Aqua Fair 1996 was a DEQ workshop held on November 15th at the Trade Mart Building in Jackson on the state fairgrounds. Project director Laura Beiser of OPC coordinated the day-long event, which included 19 exhibits, 50 activity stations, and 250 teachers with 2,400 fifth-grade students who arrived by the busloads. The Office of Geology participated in this workshop with a demonstration of its Failing 1500 drill rig and an activity station entitled "When Mississippi was an Ocean."

The first Office of Geology/Public Relations geology workshop was conducted on April 6, 1995, with invitations extended only to those teachers in Mississippi classified as geology teachers—all eleven of them. Others wanted to participate and exceptions were made. These exceptions included Mary Dockery, wife of the presenter, Marsha Mabry, wife of DEQ's Sam Mabry, and John Davis of St. Andrew's Middle School. The workshop was held at the LeFleur's Bluff State Park clubhouse and was attended only by the three teachers mentioned above, as many of those listed as geology teachers had moved on to other subjects and different schools. Also participating in the activities were Turner, Aimee Faulkner of the DEQ Public Relations Division, and two staff members from the Mississippi Department of Education. The small size made the workshop an interactive, friendly environment.

The LeFleur's Bluff workshop was entirely geology and included a field trip to a fossil locality on a nearby nature trail. It seemed a worthwhile venture even though attendance was low. At the invitation of John Davis, Turner planned a second workshop in the fall of 1995 at St. Andrew's Middle School campus in Ridgeland, Mississippi, at a time that certain of the school's classrooms would be available. Assisting Turner with the St. Andrew's workshop was her new understudy, Jennifer Reed.

An important teacher resource for workshops became available on October 11, 1995. The June 1995 issue of *Mississippi Geology* was released with an article entitled "Rocks and fossils collected from Mississippi gravel" (Dockery, 1995). This issue would serve as a guidebook for collecting in gravel and was prompted by the work of John Davis (see Davis, 1988), who had student rock collections at St. Andrew's. The first printing of 2,400 copies was soon depleted, and the issue was reprinted at another 2,000 copies. This guidebook has also been used by the Louisiana State University Geology Department in teacher courses, as the gravel in Louisiana is similar to that in Mississippi.

The St. Andrew's workshop was held on October 27, 1995, and included about 56 science teachers in grades 1-5 from around the state. Teachers rotated between three sessions. One session examined the historical geology of the state and was presented by the writer. One focused on the identification of rocks and fossils in gravel and was presented by John Davis. The third session was a class in making "fossil" molds of seashells, using plaster of Paris. It was presented by Ann Ranck of St. Andrew's.

The St. Andrew's workshop included a field trip to a gravel parking lot next to the school's gym. Several fresh loads of

Figure 2. Teachers participating in DEQ's second geology workshop held at St. Andrew's Episcopal Middle School in Ridgeland, Mississippi, on October 27, 1995. Before them is the gravel parking lot for the gym where several fresh loads of washed gravel were spread to make more interesting rock and fossil collecting for the teachers.

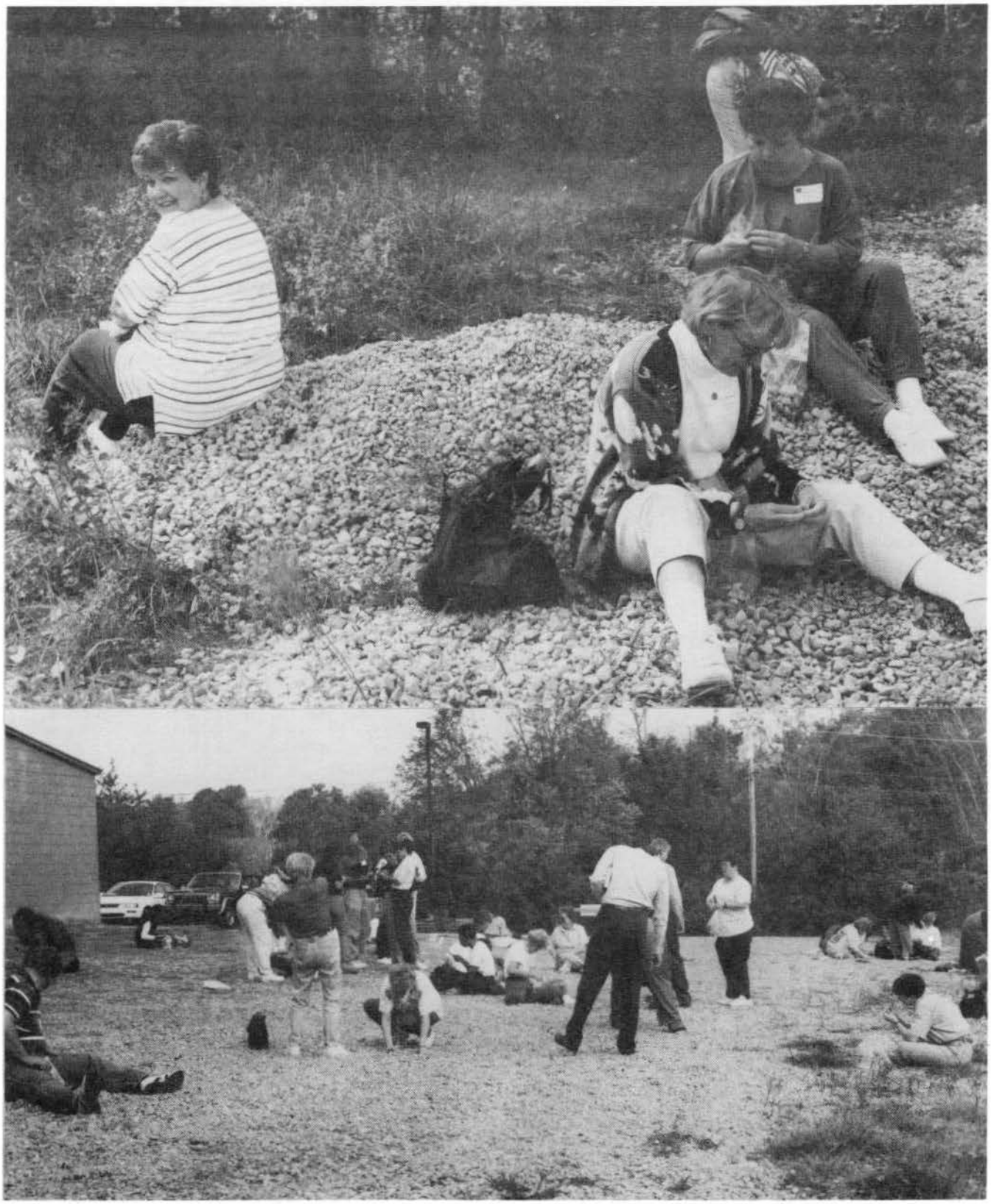


Figure 3. Teachers exhibiting various rock-collecting postures.

gravel had been added for the workshop, allowing the teachers to collect rocks and fossils for later identification. During the field trip, teachers were scattered about the gravel lot in varying postures with the enthusiasm of their energetic students (figures 1-3). Their finds were to be used in making egg-carton rock collections, an idea borrowed from John Davis (see Davis and Dockery, 1996).

Photographs of the teachers collecting rocks at St. Andrew's appeared on the cover of the November 1995 issue of the DEQ newsletter *Environmental News* (Turner, 1995) under the heading "Fossil workshop for teachers." This issue also advertized a fossil collection competition to be held on February 24, 1996, at the Office of Geology booth at the Mississippi Gem and Mineral Show. The response at the Gem and Mineral Show was surprisingly good with 47 egg-carton rock and fossil collections entered by schoolchildren and by entire classes as a group project. Each entry was given a certificate of participation and first, second, and third place awards were given.

Three workshops were held in the spring semester of 1996. These were located in the southern, central, and northern parts of the state so that they could be made readily available to teachers statewide. In addition to geology, these workshops included aquatic biology taught by Mike Beiser and hands-on physics by various instructors. Managing the registration and details were Turner and Reed.

The first workshop of 1996 was held at the University of Southern Mississippi in Hattiesburg on March 1, 1996, and included about 35 teachers. The second was held at St. Andrew's Middle School in Ridgeland on March 5, 1996, and included about 40 teachers. The physics section of this workshop was the making of paper airplanes as taught by John Davis with the help of several of his students on the "paper air force team." Teachers discovered how to make paper airplanes designed to fly certain ways. A fourth session included Internet access to paleontology. The geology session included a field trip to collect rocks in a gravel parking lot. The third workshop was held at the University of Mississippi in Oxford on March 7, 1996.

An afternoon workshop in geology was held at St. Andrew's Middle School in conjunction with the annual meeting of the Southeastern Section of the Geological Society of America on March 14, 1996. This workshop was sponsored by Gail Russell of the University of Southern Mississippi Geology Department. Russell served as a GSA coordinator for science education. Though only a few teachers attended, it proved to be a worthwhile endeavor.

Eleana Turner retired from DEQ's Public Relations Division on April 1 of 1996 to take a job with the Mississippi Forestry Association. Fortunately, the science-teacher workshops continued under the leadership of Jennifer Reed in coordination with Brian Knippers of the Mississippi Department of Education. Two workshops were conducted during the fall semester of 1996, one at St. Andrew's Middle School on October 14th with 75 teachers and one at the University of Mississippi on October 18th with 69 teachers (facilities at the University of Southern Mississippi were not available).

In preparation for these workshops, a new product, "Windows into Mississippi's geologic past" was completed using desktop publishing. This work contained descriptions of geologic sites around the state, ranging in age from 400-million-year-old Devonian rocks to ten-thousand-year-old Pleistocene sediments, with brief fictional visits to those sites in the past. Ancient scenes were illustrated by exceptional fifth and sixth-grade art. One hundred fifty copies of this 64-page activity book were printed as spiral-bound photocopies. Each geology session consisted of two parts, one on the use of "Windows" to teach the state's geologic history and the other on the use of the June 1995 issue of *Mississippi Geology* to teach the identification of rocks and fossils. The St. Andrew's workshop was held on October 14, 1996, and included about 75 teachers. The University of Mississippi workshop was held on October 18, 1996, in the Biology Building and included about 40 teachers. Use of the Biology Department facilities provided microscopes necessary for the aquatic biology session.

Three thousand copies of "Windows" (Dockery, 1997a) were commercially printed as the Mississippi Office of Geology Circular 6 and delivered on February 14, 1997. These would be used in workshops held in the spring semester of 1997. A $5.00 registration fee would be charged to cover the cost of the publications. By the end of March 1997, Circular 6 had sold 140 copies to workshop participants and the public.

A second egg-carton collection competition was held on February 22, 1997, at the annual Gem and Mineral Society rock show. Fifty-three collections were entered. Winner's names were published in the December 1996 issue of *Mississippi Geology*.

The spring 1997 workshops were held in the University of Mississippi Biology Building on March 7th and at Southside Assembly of God in Jackson on March 21st of 1997. These workshops featured sessions in geology, aquatic biology, and recycling. Twenty-two teachers attended the University of Mississippi workshop and 72 attended the Southside Assembly of God workshop.

A third geology resource for teachers became available April 8, 1997, with the release of the December 1996 issue of *Mississippi Geology*. This issue featured a cover article entitled "More rocks and fossils from Mississippi gravel" (Dockery, 1997b).

The success of DEQ's science-teacher workshops is based largely on the commitment of the department's Public Relation's Office and the cooperation and support of Brian Knippers, who is in charge of the Science Curricula for the Mississippi Department of Education. Part of this success is due to the program's flexibility in use of presenters and locations (to see that the show will go on). It has certainly served as a useful tool for science teachers across the state and boosted the department's public image.

HOW TO ATTEND A DEQ SCIENCE-TEACHER WORKSHOP

Those wishing to register for a science-teacher workshop should contact Jennifer Reed, DEQ Public Relations, at 601-961-5214.

REFERENCES CITED

Davis, J. D., 1988, The use of school campus gravels in teaching paleontology and Earth history in a fifth grade general science program (abstract): Journal of the Mississippi Academy of Sciences, v. 33, Supplement, p. 103.

Davis, J. D., and D. T. Dockery III, 1996, The egg carton fossil collection: a statewide Earth science competition for elementary school children (abstract): Journal of the Mississippi Academy of Sciences, v. 41, issue 1, p. 54.

Dockery, D. T., III, 1995, Rocks and fossils collected from Mississippi gravel: Mississippi Geology (June 1995 issue), v. 16, no. 2, p. 25-42, pl. 1-6.

Dockery, D. T., III, 1997a, Windows into Mississippi's geologic past: Mississippi Office of Geology, Circular 6, 64 p.

Dockery, D. T., III, 1997b, More rocks and fossils from Mississippi gravel: Mississippi Geology (December 1996 issue), v. 17, no. 4, p. 65-74, pl. 1-4.

Scheu, L., 1994, Publications on fossil mollusks. The State of Mississippi: American Conchologist, v. 22, no. 4, p. 25.

Turner, E., 1995, Fossil workshop for teachers: Environmental News, v. 15, no. 3, p. 1.

MISSISSIPPI OFFICE OF GEOLOGY PUBLICATION SALES FOR FISCAL YEAR 1996

Margaret Allen and Michael B. E. Bograd
Mississippi Office of Geology

This article is a tabulation and brief analysis of the maps and publications sold by the Map and Publication Sales office of the Office of Geology during Fiscal Year 1996, which ended June 30, 1996. The tabulation is in the same format as in the article on publication sales for Fiscal Year 1995 (Allen and Bograd, 1995). The sales office is the means used by the Office of Geology to fulfill its mandate to distribute the publications resulting from its various research projects. The following tabulation helps identify those publications and areas of research found most useful by industry and the public.

FY 1996 Sales

Maps	13,531
Bulletins	564
Circulars	45
Cross Sections	17
Environmental Geology Series	1
Information Series	10
Open-File Reports	88
Reports of Investigations	42

The Office of Geology has several series of publications. The Bulletin series was begun in 1907. Of the 130 titles in the series, 101 are still in print and available for sale; all but 15 titles had sales of at least one copy during the year. The top sellers in the Bulletin series (with abbreviated titles) were B105, Hinds County geology, 40 copies; B113, water resources of Mississippi, 34 copies; B130, geology and coastal erosion at Belle Fontaine, 28 copies; B115, Rankin County geology, 23 copies; and B83, fresh water strata on electrical logs, 23 copies. The largest seller of the five Circulars in print was C4, the Frankstown vertebrate fossil locality, with 24 copies. The new title in the Reports of Investigations series, RI3, *Chemical Data and Electrical Resistivity Values (Rw's) Determined from Analyses of Produced Formation Waters from Oil and Gas Well Tests in Mississippi*, accounted for 33 of the sales, plus 5 more in the diskette format. Sales of Open-File Reports were spread over several of the later releases. Three titles were added to this series during the year: OF41, *The Petrophysical Attributes of Cretaceous Reservoirs of Southern Mississippi and Adjacent State Waters*; OF42, *The Petrophysical Characteristics of Jurassic Reservoirs of the Coastal Mississippi Counties and Adjacent State Waters*; and OF43, *Beach and Nearshore Sediment Budget of Harrison County, Mississippi: A Historical Analysis*. The biggest seller among the maps and charts was the Geologic Map of Mississippi, with 115 copies. Other titles include the economic minerals map, structural features map, stratigraphic column, chart of producing formations, and Mississippi Sound lease block maps.

In addition to the geological reports published by the Office of Geology, Map and Publication Sales stocks all of the topographic maps available for the State of Mississippi. These excellent maps are produced by the U.S. Geological Survey, and are made conveniently available by the Office of Geology as a public service. The majority of the "Maps" in the tabulation above are topographic maps, mostly 7.5-minute quadrangles (scale 1:24,000) with some 15-minute quadrangles (scale 1:62,500). In August 1995, the U.S. Geological Survey instituted a 92% increase in the price of topographic maps charged to map dealers. As a result, the Office of Geology raised its price for maps from $3 to $5 each on October 1, 1995. The price increase had an effect on the number of maps sold. During the four quarters of fiscal year 1995 and the first quarter of fiscal year 1996, sales were 4105, 3126, 3537, 3297, and 4156 maps. After the price increase on October 1, 1995, topographic map sales were 2454 in the second quarter of fiscal year 1996, 2740 in the third quarter, and 2600 in the fourth quarter.

The Map and Publication Sales office also handles the distribution of back issues of the Office of Geology's quarterly journal *Mississippi Geology*. This publication contains technical and popular articles dealing with the geology, paleontology, and mineral resources of Mississippi. Some of the articles are useful for educational purposes. There is no charge for a subscription or for back issues of the journal so it is not included in the publication sales tabulation. The circulation is 980, and something on the order of 200 additional copies are distributed to staff and visitors in the office. Volume 17 of *Mississippi Geology* was published during calendar year 1996 and Volume 18 will be published during calendar year 1997. An index to *Mississippi Geology*, updated after each issue is published, is available as Open-File Report 15, "Current Index to *Mississippi Geology*," for $2.00 ($2.50 by mail).

The figures presented here were compiled by Margaret Allen and analyzed by Michael B. E. Bograd. They represent only a partial report on the map and publication sales activities of the Office of Geology. Many other items not mentioned in this brief overview are available as well. For additional information about the available publications of the Mississippi Geological Survey / Office of Geology, please visit our Map and Publication Sales office at Southport Center, intersection of Highway 80 and Ellis Avenue, Jackson, Mississippi, weekdays from 8 a.m. to 5 p.m. You may call the Office of Geology for information at (601) 961-5500. The direct number for Map and Publication Sales is (601) 961-5523. Our fax number is (601) 961-5521. The mailing address is:

Mississippi Office of Geology
P.O. Box 20307
Jackson, MS 39289-1307

REFERENCE CITED

Allen, Margaret, and Michael B. E. Bograd, 1995, Mississippi Office of Geology publication sales for fiscal year 1995: Mississippi Geology, v. 16, no. 1, p. 22.

An up-to-date index of *Mississippi Geology* is available from the Office of Geology. Open-File Report 15, "Current Index to *Mississippi Geology*," compiled by Michael B. E. Bograd, is available for $2.00 ($2.50 by mail) from the Office of Geology, P.O. Box 20307, Jackson, MS 39289.