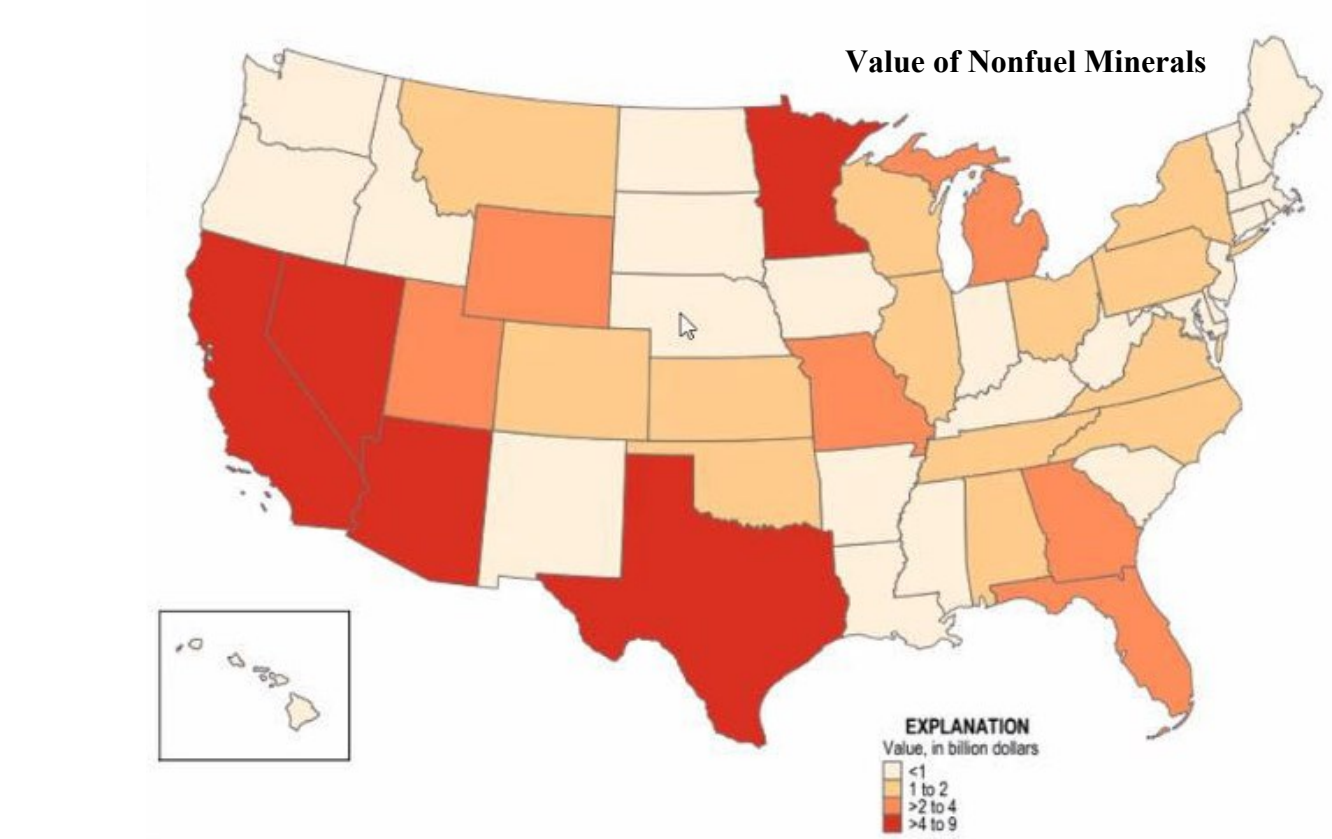
MISSISSIPPI GEOLOGICAL SOCIETY

eBULLETIN

Volume 70 No. 3 November 2021



NOVEMBER MEETING CANCELLED

PASSAGE OF THE BIPARTISAN INFRASTRUCTURE BILL IS A BOOM FOR THE AGGREGATE INDUSTRY AND GEOLOGIC MAPPING
Dr. David T. Dockery, RPG, Office of Geology

OIL PATCH QUIZ
Steve Walkinshaw, Vision Exploration

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PRESIDENT'S LETTER

David Snodgrass, MSOGB

Last month we discussed the potential of Hydrogen Gas storage in Mississippi. Please see the press release on the next page from Hy Stor regarding their Green Hydrogen Storage Hub. Finally, as previously mentioned, due to the ongoing Covid-19 pandemic the MGS as decided to postpone our monthly luncheons at the River Hills Country Club until further notice. Hopefully, we will be getting back to normal soon in the up-coming months as this will not last forever. For now, take care and stay safe.

MSG President,

David H. Snodgrass

PRESIDENT'S LETTER

David Snodgrass, MSOGB

Hy Stor Energy Developing First-Ever U.S. Zero-Carbon Green Hydrogen Storage Hub

Mississippi Clean Hydrogen Hub Represents Largest Green Hydrogen Project of its Kind in the U.S., Bringing Economic Revitalization and Reliable 100% Carbon-free Energy to Mississippi

JACKSON, Miss.--(BUSINESS WIRE)--Today, Hy Stor Energy LP (Hy Stor Energy) announced its mission to develop and advance the production, storage and delivery of green hydrogen at scale in the United States. Hy Stor Energy, together with its strategic partner Connor, Clark & Lunn Infrastructure (CC&L Infrastructure), will develop, commercialize, and operate large-scale, long-duration hydrogen hubs that will serve as a model for our nation's green hydrogen development efforts going forward. The first major project, the Mississippi Clean Hydrogen Hub, is under active development and has multiple sites permitted for hydrogen storage.

"We're excited to welcome Hy Stor Energy and hydrogen innovators to Mississippi"
Tweet this

The planned scale of the Mississippi Clean Hydrogen Hub is up to 10 times larger than any other green hydrogen project under consideration in the U.S. and would be one of the largest in the world. During its first phase, the Mississippi Clean Hydrogen Hub is expected to produce an estimated 110 million kilograms (kg) of green hydrogen annually and store more than 70 million kg of green hydrogen in its underground salt caverns. Pending regulatory approvals and equipment availability, the hub's first phase is planned to enter commercial service by 2025.

"Mississippi's well-established and robust energy network is strategically positioned to support Hy Stor Energy and the growth of a Mississippi hydrogen hub. We welcome this innovative opportunity to share our unique salt dome storage capacity and our trained workforce," said Lieutenant Governor of Mississippi Delbert Hosemann.

"The biggest challenge the energy transition faces today is how to bridge the gap to allow renewables to replace fossil fuel electric power generation safely and reliably. In an era of increasingly frequent extreme weather, it's imperative to have the ability to store large quantities of renewable energy capable of providing multiple days of power over long periods of high demand," said Laura L. Luce, CEO of Hy Stor Energy. "We believe the approach we're taking in Mississippi will become the blueprint for future green hydrogen projects that not only address the energy transition challenges we face but also bring new jobs, economic revitalization, and low-cost energy to communities in the region. We see this as an important way of advancing U.S. climate leadership."

PRESIDENT'S LETTER

David Snodgrass, MSOGB

"Green hydrogen will play a vital role in the decarbonization of our global societies by offering a viable pathway towards zero emissions," said Claire Behar, CCO of Hy Stor Energy. "Hy Stor Energy will serve customers across a variety of industries including transportation, power generation, and difficult to decarbonize sectors, such as manufacturing and industrials, where green hydrogen can replace fossil fuels."

This project will greatly benefit the state of Mississippi's economy and environment by providing reliable clean energy, while stimulating growth for the long term. The development and commercialization phases are expected to create hundreds of new jobs and attract new manufacturing and industrial companies to the state. The Mississippi Clean Hydrogen Hub will also bring education and workforce development opportunities, supporting the transition to a local and resilient green hydrogen energy system.

"We're excited to welcome Hy Stor Energy and hydrogen innovators to Mississippi," said Speaker of the Mississippi House of Representatives Philip Gunn. "Their investment and eventual success here will improve workforce development, bring high paying jobs to our state, and encourage other businesses to invest in the talent and infrastructure we've built together."

"We have worked with a number of cutting-edge and innovative hydrogen-related projects across the world," said Matt Weaver, Business Lead – North America of Nel Hydrogen. "Based on that experience, we believe that the Mississippi Clean Hydrogen Hub proposed by Hy Stor Energy is truly groundbreaking and can serve as a model for green hydrogen efforts going forward."

Hy Stor Energy selected Mississippi to develop its first green hydrogen hub because of the state's distinct geology, strategic geographic location, abundance of available water and renewable energy from the sun and wind, and collaborative business environment. The region boasts multiple naturally occurring underground salt formations that can support development of large caverns, allowing for the safe and effective storage of several years' worth of green hydrogen. These strategic locations are enhanced by the proximity to existing infrastructure including an array of interstate gas transportation pipelines and electric transmission lines, as well as interstate highways, rail lines, deep water ports, and the Mississippi River.

PRESIDENT'S LETTER

David Snodgrass, MSOGB

About Hy Stor Energy

Hy Stor Energy is facilitating the transition to a fossil-free energy environment by developing and advancing green hydrogen at scale through the development, commercialization, and operation of green hydrogen hub projects. Large, fully integrated projects produce, store, and deliver 100% carbon-free energy, providing customers with safe and reliable renewable energy on-demand. Developed as part of an integrated hub, these projects couple on-site green hydrogen production with integrated long-duration storage and distribution – using scale to reduce costs. Hy Stor Energy, led by energy storage industry and hydrogen technology veteran Laura L. Luce, has an innovative team with deep expertise and is positioned as a leader in the green hydrogen revolution. For more information, please visit www.hystorenergy.com.

About Connor, Clark & Lunn Infrastructure

CC&L Infrastructure invests in middle-market infrastructure assets with highly attractive risk-return characteristics, long lives and the potential to generate stable cash flows. The firm has been an active investor and owner of renewable energy assets for more than 15 years. Its portfolio includes more than 60 hydro, solar, and wind facilities totaling 1.4 GW of clean energy generating capacity globally. CC&L Infrastructure is a part of Connor, Clark & Lunn Financial Group Ltd., a multi-boutique asset management firm whose affiliates collectively manage over CAD$100 billion in assets. For more information, please visit www.cclinfrastructure.com.

Contacts

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Kaitlin Blainey
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Connor, Clark & Lunn Infrastructure
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kblainey@cclgroup.com

2021-2022 MGS MEETING SCHEDULE

When	What/Who	Where
September	Fall BBQ	Cancelled
October	Cancelled	Cancelled
November	TBD	Cancelled
December	MAPL Cocktail Party	TBD
January	TBD	River Hills - 11:30am
February	TBD	River Hills – 11:30am
March	TBD	River Hills – 11:30am
April	TBD	River Hills - 11:30am
May	Boland Scholarship Awards	TBD

OFFICERS MEETINGS
TBD
TBD
TBD
TBD
TBD
TBD
TBD
TBD

MGS SCHOLARSHIP AWARDS

Faculty & Students,

This is a new year and the Mississippi Geological Society along with the Boland Scholarship Fund would like to remind you that we want to honor the most outstanding overall students for the 2021-2022 year.

Each year, the Boland Scholarship awards 1 student from each institution a check that rewards students for their hard work and dedication to the Geosciences and their community.

We look forward to a great year and hope to see you at our monthly meetings.

Best Regards,

Matt Caton
Editor

MISSISSIPPI STATE

The University of Mississippi

THE UNIVERSITY OF SOUTHERN MISSISSIPPI

MILLSAPS COLLEGE

MONTHLY POST

Dr. David T. Dockery lll RPG

PASSAGE OF THE BIPARTISAN INFRASTRUCTURE BILL IS A BOOM FOR THE AGGREGATE INDUSTRY AND GEOLOGIC MAPPING

David T. Dockery III, RPG

The $1 trillion bipartisan infrastructure bill (BIB) has passed and includes $550 billion in new funding for transportation, broadband, and utilities. It also includes $64 million for Earth MRI in FY22—Earth MRI has been at $10 million per year. This money will likely be spent on large geophysical survey and LiDAR footpirnts and ample money for geology. It also means a go-ahead for the Rocks Act advisory panel on stone, sand, gravel [aggregate] resource mapping. Aggregate mining is a large business in Mississippi. The House placed the National Cooperative Geologic Mapping Program (NCGMP) at $44.4 million in FY22, a significant increase.

The following is a discussion of this bill in a Thursday noon, September 2, Association of American State Geologists' Zoom meeting. The two-hour conference discussed the development of derivative geologic maps to locate sand and gravel resources. Figure 1 is a graph of construction aggregate production in the U.S. from 1945-2020, which largely follows economic trends. In some states, such as Minnesota, urban expansion into mining areas has significantly reduced local sources of aggregate.

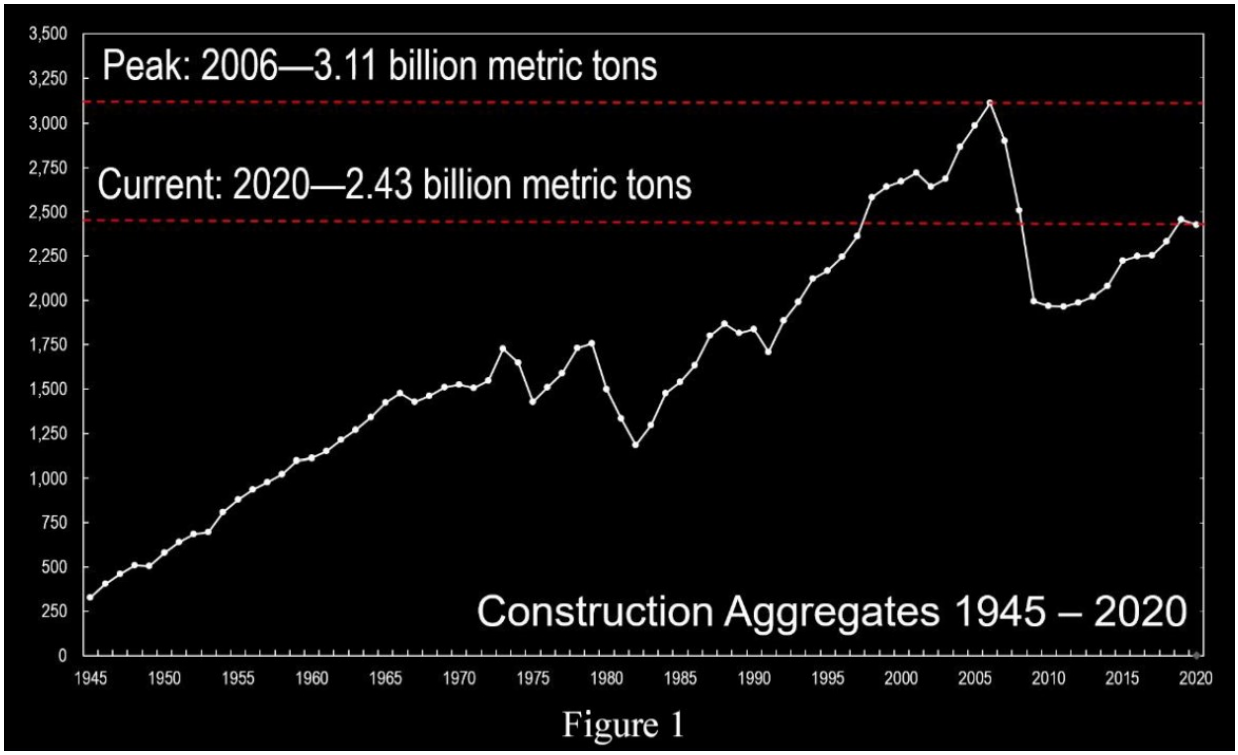


Figure 1

FIGURE 1

In Figure 2, urban expansion has reduced the area's supply of sand and gravel by 47%.

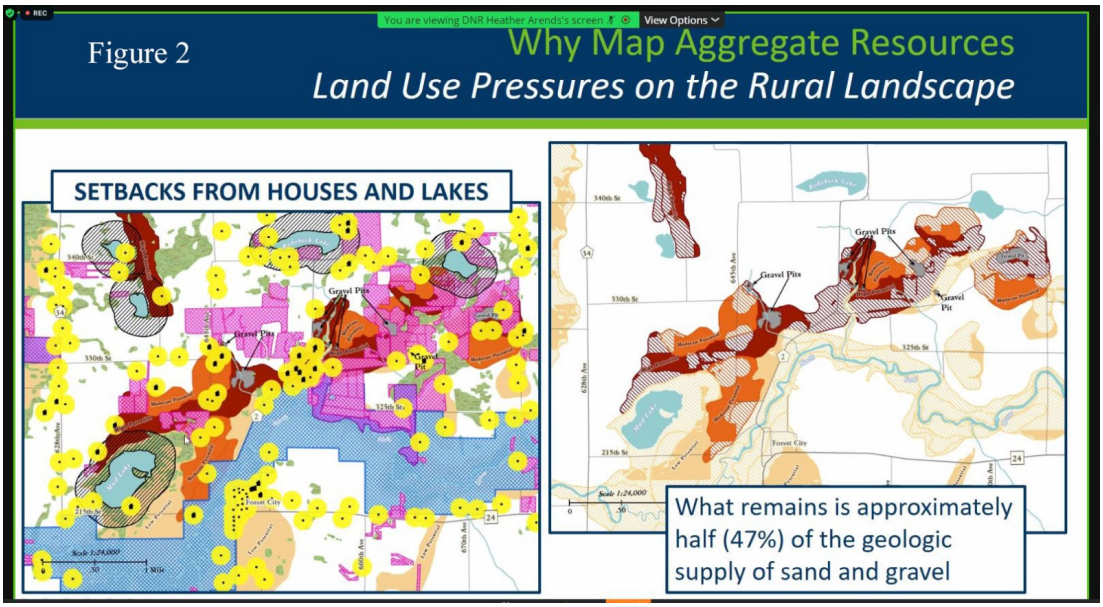


FIGURE 2

While Minnesota is #5 among the states in nonfuel mining, Mississippi is #38 as shown by the X in Figure 3. Mining of aggregate is dependent on demand and economic growth. A new home requires almost 500 tons of aggregate. A new school requires at least 3,000 cubic yards of ready-mix concrete. A new wind turbine requires 700 cubic yards of concrete.

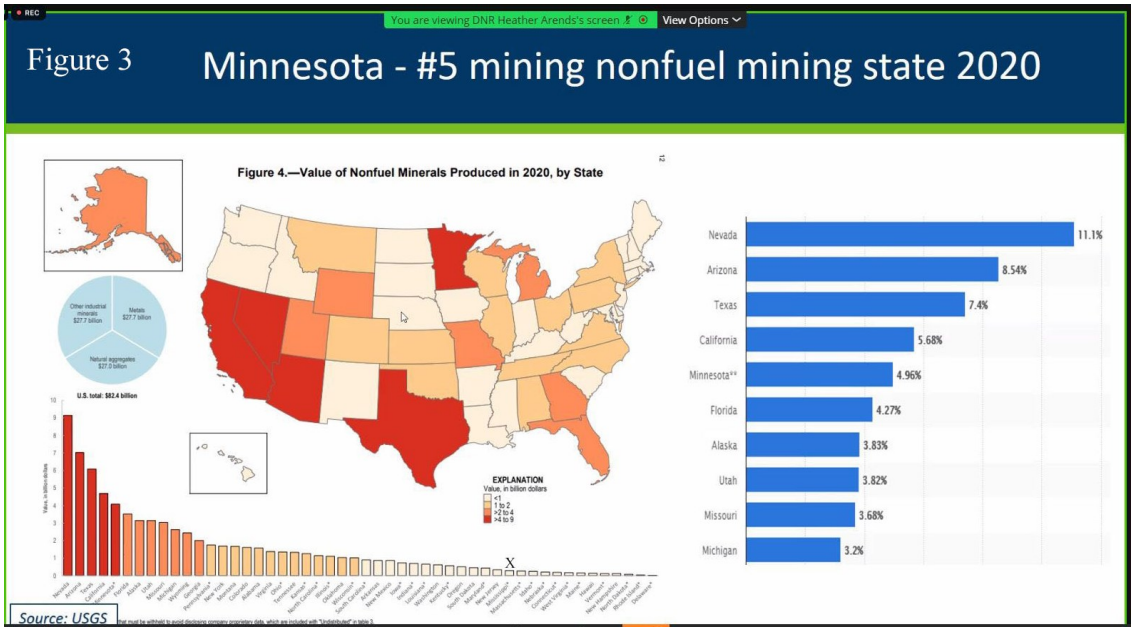


FIGURE 3

MONTHLY POST

Dr. David T. Dockery lll RPG

After the AASG Zoom meeting, I requested a graph of aggregated production in Mississippi from the first presenter, Jason C. Willett of the USGS, who offered to help us with requests for aggregate production information. Figure 4 is a graph for U.S. production of aggregates.

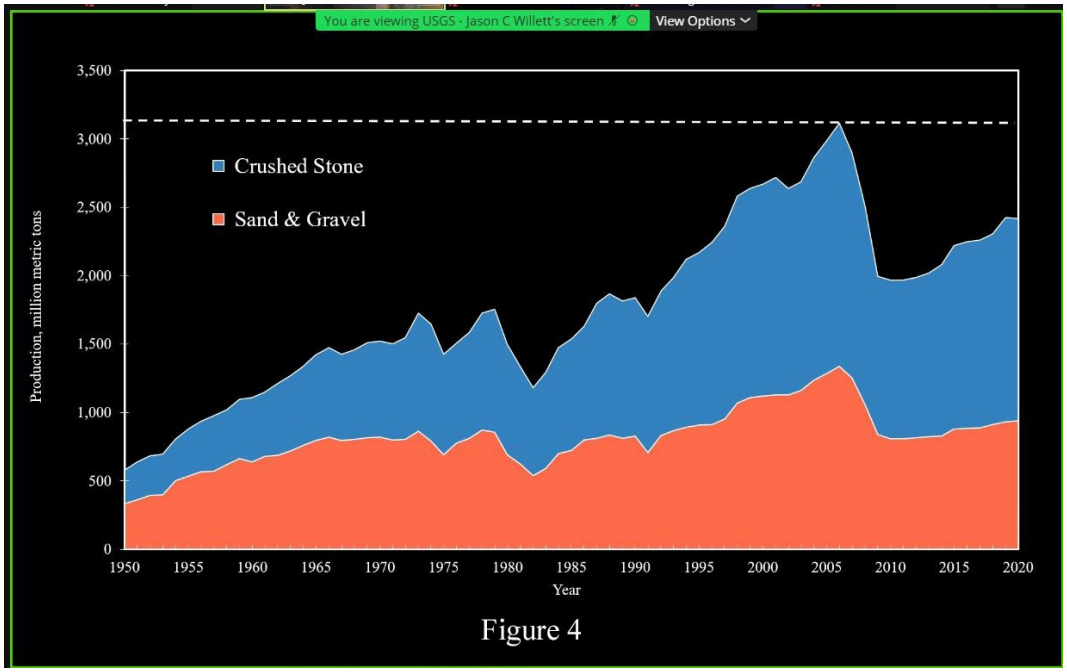


FIGURE 4

Figure 5 is a graph, which Willet made at my request, for Mississippi production of aggregates from 1971-2019. Both production graphs follow economic trends. Mississippi aggregate production was on the rise in 2019 and could go much higher with the passage of BIB.

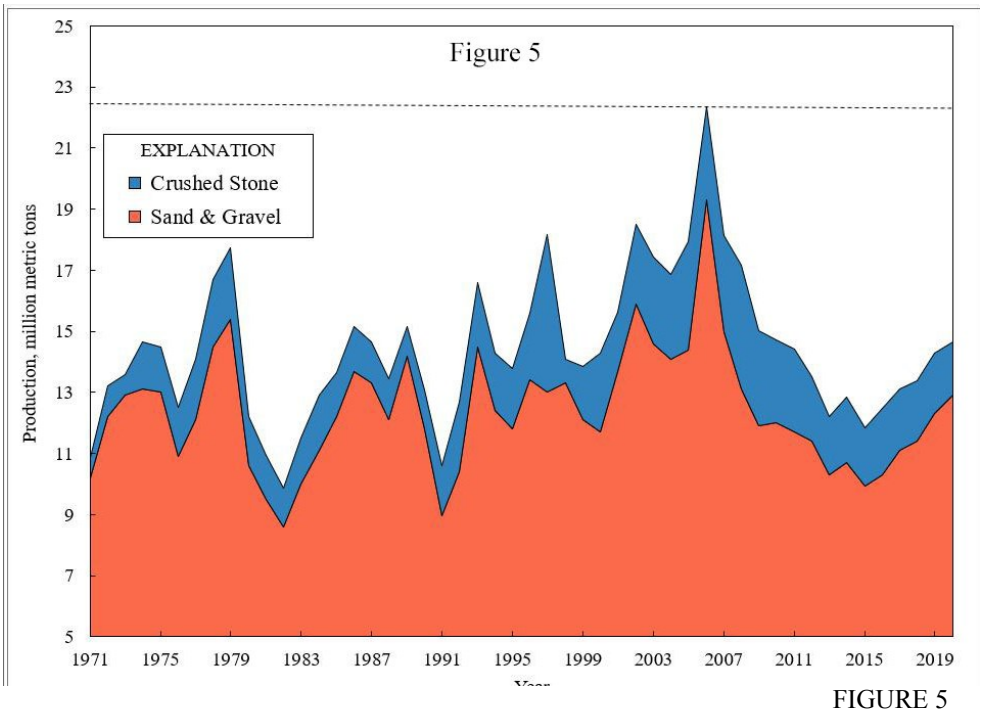


FIGURE 5

CURRENT PRICES

Crude Oil WTI (NYM $/bbl) Front Month

+ WATCHLIST

OPEN

Last Updated: Nov 16, 2021 at 9:47 a.m. EST - Delayed quote

$80.60

-0.28 -0.35%

SETTLEMENT PRICE 11/15/2021

$80.88

Natural Gas Continuous Contract

+ WATCHLIST

OPEN

Last Updated: Nov 16, 2021 at 9:48 a.m. EST - Delayed quote

$5.381

▲ 0.277 5.43%

SETTLEMENT PRICE 11/15/2021

$5.104

Marketwatch

MONTHLY QUIZ

Steve Walkinshaw

OIL PATCH QUIZ

Let's talk about oil and gas trapped in "basement" reservoirs (typically, weathered and fractured igneous rocks (granites, quartzites, and volcanics, etc.) and metamorphic rocks).

It appears the best basement reservoirs are fractured granites or quartzites since they are very brittle and fracture optimally. Weathering further enhances these fractured reservoirs.

The rocks that harbor many of these basement reservoirs are extremely old. Shown in the montage are images of several prolific basement reservoirs located in different countries around the world.

Questions...

Part 1: See Image "I", a 2D seismic line across arguably the largest (>1.0 - 1.4 Bbo) basement oilfield discovered in Asia. (a) What is the name of this field? (b) In what country is it located? (c) What company drilled the (shallow) discovery well atop this structure 46 years ago, but was unable to develop the field?

Part 2: See images "F" and "G", featuring the largest basement oilfield complex discovered in the Americas. This large structure actually hosts 2 fields that are trapped atop the same structural high. The northern field ("K") has produced >300 MMbo from basement rocks, while the southern field ("J") has produced >250 MMbo from basement rocks. What are the names of fields (a) "K" and (b) "J"? (c) What type of basement rocks form the "core" of the uplift?

Part 3: What calculation was used to predict the presence of a large oil reservoir in the basement rocks of "J", before it was discovered?

Part 4: (a) What is believed to be the largest basement oilfield in Africa (two words, hyphenated; not shown on the montage)? (b) In what country is it located? (c) In what basin?

Part 5: See Image "C", a 3D line across a giant (6 TCF) Asian basement gas field that was discovered 23 years ago (4,100' gas column). The best well flowed 150 MMCFGPD (constrained). (a) What is the name of this field? (b) In what country is it located?

Part 6: See Image "C". A 2 TCF gas discovery was made 2 years ago along this same trend, extending it ~36 miles northeast. What company operated this recent 45 MMCFGPD discovery?

Answers at end of Bulletin

MONTHLY QUIZ

Steve Walkinshaw

OIL PATCH QUIZ

Part 7: "A" and "D" are images of two separate South American basement reservoirs, both located in the same prolific basin. (a) What is the name of the basement oilfield "A", first discovered in 1918 (in shallower reservoirs above the basement)? (b) What is the name of the basement gas field "D"? (c) What basin are they located in? (d) What are the two source rocks in this basin?

Part 8: What is the lithology of the cored reservoir shown in "B"?

Part 9: "H" is a 3D line across another large Asian basement oil field (2,460' oil column). The source is believed to be the Madir Shale. (a) What is the name of this field? (b) What is labeled "M"? (c) What is labeled "N"?

Bonus:

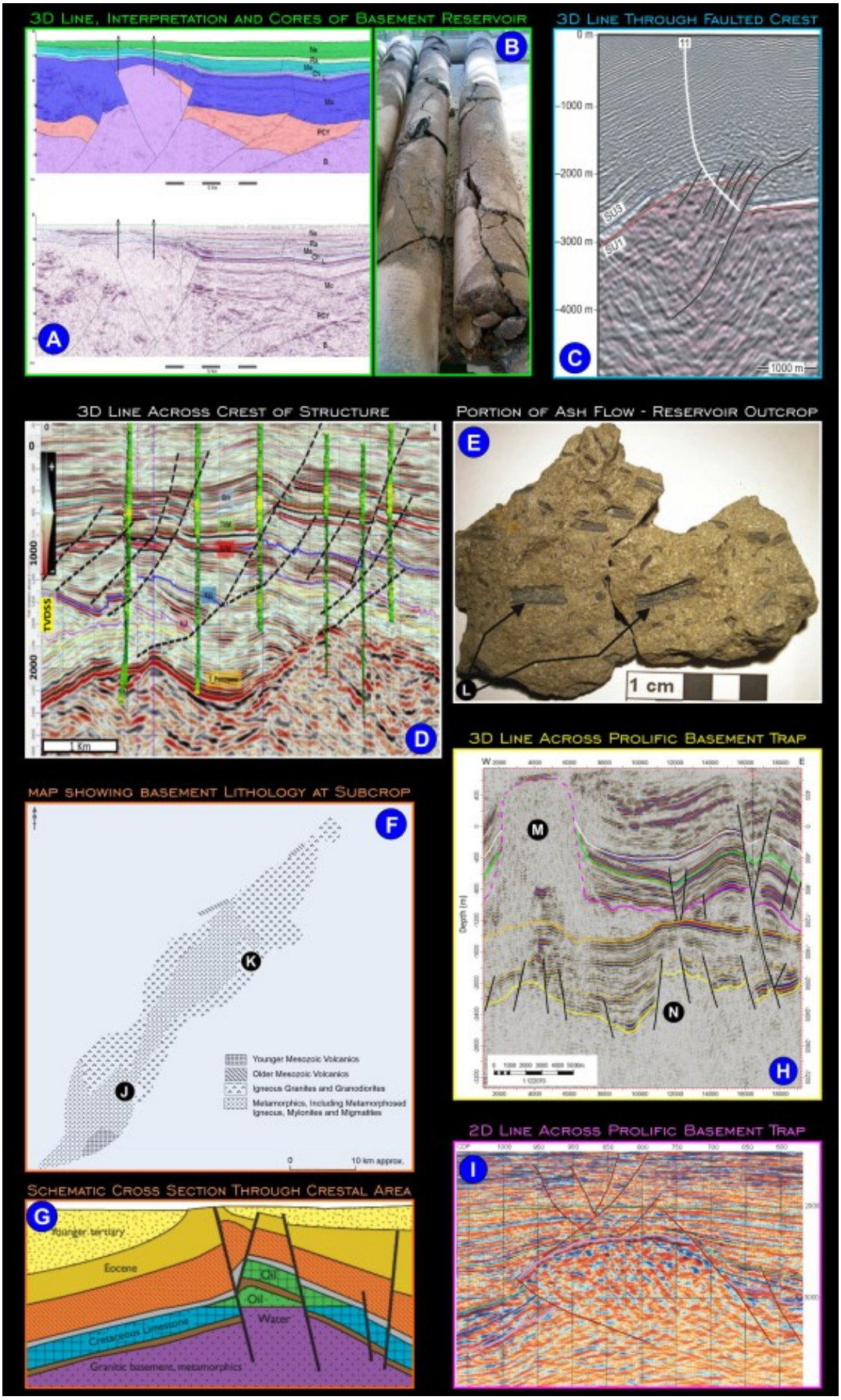
Part 10: See Image "E". What are the black arrows ("L") pointing to?

Part 11: Name four U.S. states that have produced significant volumes of oil from basement reservoirs.

Answers at end of Bulletin

MONTHLY QUIZ

Steve Walkinshaw



GEOLOGY POST

ARTICLES, PAPERS or NEWS?

ATTENTION!!!!! Industry, Professors and Students:

I am looking for more content from the industry and our schools.

Submissions can include anything from professional papers, thesis abstracts, job opportunities to pictures. Anything!!!!

If you have any information or news you would like to share with the Society **PLEASE** email them to the MGS Editor at:

mcaton13@yahoo.com

Thanks & Regards,

Matt Caton
Editor

GEO LINK POST

USGS TAPESTRY OF TIME AND TERRAIN http://tapestry.usgs.gov The CCGS is donating to all of the 5th and 6th grade schools in the Coastal Bend. Check it out—it is a spectacular map. You might want a framed one for your own office. The one in my office has glass and a metal frame, and it cost $400 and it does not look as good as the ones we are giving to the schools. Call Owen 510-6224 if you want one for your office for $150. Duncan, Mike, Chris, Dave, Bob Randy, Seb., Kevin, Ken, Craig, Patrick, Robert.

FREE TEXAS TOPO'S http://www.tnris.state.tx.us/digital.htm these are TIFF files from your state government that can be downloaded and printed. You can add them to SMT by converting them first in Globalmapper. Other digital data as well.

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http://www.geographynetwork.com/ Go here and try their top 5 map services. My favorite is 'USGS Elevation Date.' Zoom in on your favorite places and see great shaded relief images. One of my favorites is the Great Sand Dunes National Park in south central Colorado. Nice Dunes.

http://antwrp.gsfc.nasa.gov/apod/astropix.html Astronomy picture of the day — awesome. I click this page everyday.

http://www.spacimaging.com/gallery/ioweek/iow.htm Amazing satellite images. Check out the gallery.

http://www.ngdc.noaa.gov/seg/topo/globegal.shtml More great maps to share with kids and students.

www.geo.org Don't forget we have our own web page.

http://micro.magneet.fsu.edu/primer/java/scienceoptiscu/owersof10/

http://asterweb.jpl.nasa.gov/galery/default.htm Great satellite images of volcanoes

http://terra.nasa.gov/gallery/ More here

www.ermapper.com They have a great free downloadable viewer for TIFF and other graphic files called ER Viewer.

www.drillinginfo.com This is an incredible (subscription) well and completion data service for independents. Can be demo'ed for free.

http://terrasrver.com/ Go here to download free aerial photo images that can be plotted under your digital land and well data. Images down to 1 meter resolution, searchable by Lat Long coordinate. Useful for resolving well location questions.

http://www.fs.fed.us/gpnf/volcanocams/msh/ This is a live cam of Mt. St. Helens refreshed every 5 minutes. At the bottom are old videos of past eruptions in this cycle. It is worth a watch especially now.

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2021-2022

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Size	Rate/Year	Amt. Remitted
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1/2 Page Ad (6" x 4")	$300	$_____
1/4 Page Ad (3" x 4")	$200	$_____
Business Card Ad (1 1/2" x 3")	$100	$_____
Professional Listing (1/2" x 3")	$ 50	$_____

II. Web Page Advertisements (www.missgeo.com):

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(Note: Please contact Steve Walkinshaw at (601) 607-3227 or mail@visionexploration.com for details concerning placing your ad on the MGS web site.)

Total Remitted $_____

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2020-2021 David Snodgrass

MONTHLY QUIZ

Steve Walkinshaw

ANSWERS

Part 1: See Image "I", a 2D seismic line across arguably the largest (>1.0 - 1.4 Bbo) basement oilfield discovered in Asia. (a) What is the name of this field? (b) In what country is it located? (c) What company drilled the (shallow) discovery well atop this structure 46 years ago, but was unable to develop the field? (a) Bach Ho, (b) Vietnam, (c) Mobil Oil

Part 2: See images "F" and "G", featuring the largest basement oilfield complex discovered in the Americas. This large structure actually hosts 2 fields that are trapped atop the same structural high. The northern field ("K") has produced >300 MMbo from basement rocks, while the southern field ("J") has produced >250 MMbo from basement rocks. What are the names of fields (a) "K" and (b) "J"? (c) What type of basement rocks form the "core" of the uplift? (a) Mara Field, (b) La Paz Field, (c) metamorphic

Part 3: What calculation was used to predict the presence of a large oil reservoir in the basement rocks of "J", before it was discovered? material balance

Part 4: (a) What is believed to be the largest basement oilfield in Africa (two words, hyphenated; not shown on the montage)? (b) In what country is it located? (c) In what basin? (a) Augila-Naafora, (b) Libya, (c) Sirte Basin

Part 5: See Image "C", a 3D line across a giant (6 TCF) Asian basement gas field that was discovered 23 years ago (4,100' gas column). The best well flowed 150 MMCFGPD (constrained). (a) What is the name of this field? (b) In what country is it located? (a) Suban Field, (b) Indonesia (South Sumatra)

Part 6: See Image "C". A 2 TCF gas discovery was made 2 years ago along this same trend, extending it ~36 miles northeast. What company operated this recent 45 MMCFGPD discovery? Repsol

Part 7: "A" and "D" are images of two separate South American basement reservoirs, both located in the same prolific basin. (a) What is the name of the basement oilfield "A", first discovered in 1918 (in shallower reservoirs above the basement)? (b) What is the name of the basement gas field "D"? (c) What basin are they located in? (d) What are the two source rocks in this basin? (a) Octogono Field, (b) Guanaco Field, (c) Neuquen Basin, (d) Vaca Muerta (oil-prone) and Los Molles (gas-prone) Shales

Part 8: What is the lithology of the cored reservoir shown in "B"? granodiorite

Part 9: "H" is a 3D line across another large Asian basement oil field (2,460' oil column). The source is believed to be the Madir Shale. (a) What is the name of this field? (b) What is labeled "M"? (c) What is labeled "N"? (a) Habban Field, (b) diapiric salt, (c) basement (reservoir)

Part 10: See Image "E". What are the black arrows ("L") pointing to? carbonized wood fragments embedded in volcanic ash

Part 11: Name four U.S. states that have produced significant volumes of oil from basement reservoirs. California, Kansas, Oklahoma and Texas

MONTHLY QUIZ

Steve Walkinshaw

CREDITS

Images "A" and "B": "Oil from Granitoid Rocks - Reservoir Characterization of Fractured Basement in Neuquén Basin, Octógono Field, Argentina" (Diego E. Velo, Rodrigo Ugarte Oscar Pioli, Fernando Rey, Diego Narrillos, Mario Pascual, Fernando Creus, and Omar Castillo), Search and Discovery Article #20280 (2014)

Images "C", "F" and "G": "Giant and major-size oil and gas fields worldwide in basement reservoirs: state-of-the-art and future prospects" (T. Koning), GEORESOURCES, 2020 Special Issue, Pages 40-48; www.geors.ru

Image "D": "Seismic Pre-Stack Igneous Reservoir Characterization: Guanaco Field Study Case, Neuquina Basin, Argentina" (Hernán De Simone, Mario Sigismondi, and Marcelo Barrionuevo), Search and Discovery Article #20466 (2019)

Image "E": "Early Permian arc-related volcanism and sedimentation at the western margin of Gondwana: Insight from the Choiyoi Group lower section" (Leonardo Strazzere, Daniel A. Gregori, Leonardo Benedini), CONICET and Cátedra de Geología Argentina, Departamento de Geología, Universidad Nacional del Sur, Argentina, in China University of Geosciences (Beijing) and Peking University. Production and hosting by Elsevier B.V.

Image "H": "Characterization of a fractured basement reservoir using high-resolution 3D seismic and logging datasets: A case study of the Sab'atayn Basin, Yemen" (Waleed Bawazer, Aref Lashin, Mostafa M. Kinawy), King Saud University, Saudi Arabia; Benha University, Al-Azhar University, Egypt; in PLOS ONE, https://doi.org/10.1371/journal.pone.0206079; October 25, 2018

Image "I": "Bach Ho Field, A Fractured Granitic Basement Reservoir, Cuu Long Basin, Offshore SE Vietnam: A "Buried-Hill" Play" (Trinh Xuan Cuong and J. K. Warren), Journal of Petroleum Geology, Vol. 32(2), April 2009, pp 129-156