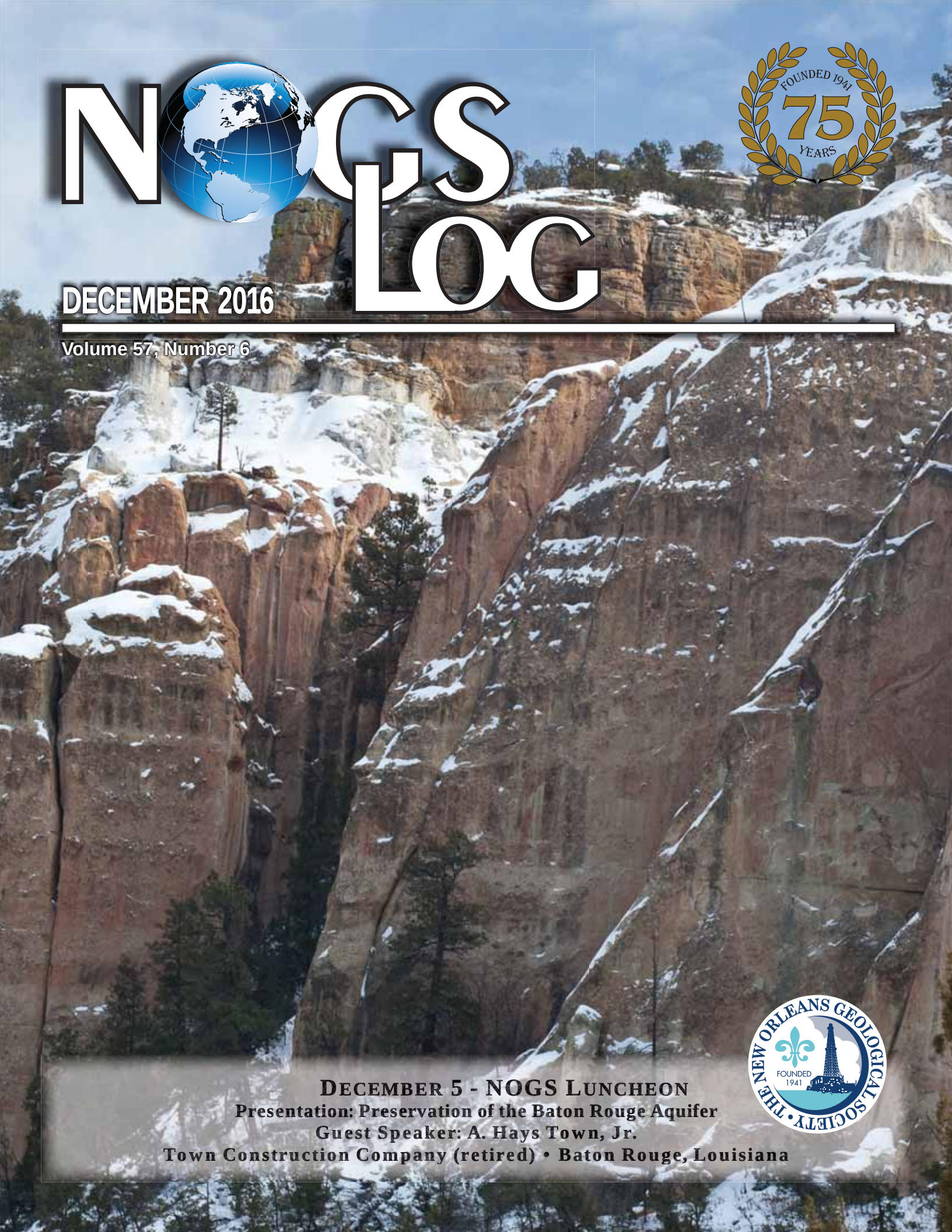


NOGS LOG

DECEMBER 2016

Volume 57, Number 6

FOUNDED 1941 75 YEARS

THE NEW ORLEANS GEOLOGICAL SOCIETY • FOUNDED 1941

DECEMBER 5 - NOGS LUNCHEON

Presentation: Preservation of the Baton Rouge Aquifer

Guest Speaker: A. Hays Town, Jr.

Town Construction Company (retired) • Baton Rouge, Louisiana

Holiday Christmas Party

FRIDAY
DECEMBER 16, 2016
7:00 - 10:00 p.m.

$35 per member
$25 per student

Home of
Catherine and Mark McRae
facing Bayou St. John

1347 Moss Street
New Orleans, Louisiana

Note: there are stairs leading up to the entrance of the home, but some NOGS members will be on hand should any party goers need assistance climbing the stairs. Also, if street parking is a concern due to accessibility reasons, please let one of the greeters know, and they will be able to assist you.

NOGS LOG

Published monthly by the New Orleans Geological Society.
This issue was sent to press on November 25, 2016.

Interested in contributing to the NOGS LOG?
Please submit items by the 1st Friday of the month to nogseditor@gmail.com. Advertising requests should contact the NOGS office at info@nogs.org.

IN THIS ISSUE

Regular Features:

Special Features:

on the cover

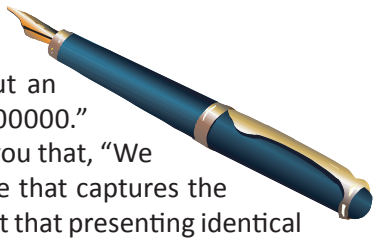
Cover Photo by Bob Wick
Bureau of Land Management, California

Cebolla Wilderness, New Mexico

"The 61,600 acre Cebolla Wilderness is made up of sandstone mesas, canyons, and grassy valleys. Juniper and piñon dominate, and ponderosa pine is found on north facing slopes. Vertical escarpments provide excellent nesting habitat for golden eagles, prairie falcons, red-tail hawks, and great horned owls. The Cebolla Wilderness is rich in prehistoric archaeological sites, petroglyphs, and historic homesteads. One notable archaeological site is the Dittert Site. Sometime between A.D. 1000 and 1300, the Dittert Site was built and inhabited by the ancestors of modern Pueblo Indian people. The Cebolla Wilderness also contains La Ventana Natural Arch, a dramatic arch sculpted through wind and water erosion in the sandstone cliffs. The Wilderness is located within the El Malpais National Conservation Area."

Text source: https://www.blm.gov/nm/st/en/prog/blm_special_areas/wilderness_and_wsas/wilderness_areas/cebolla.html

From the Editor



If you ask an engineer and a geologist to solve "2 +2 = ?," the engineer will pull out an expensive calculator, punch a variety of buttons in rapid succession, and respond with "4.000000." The geologist will lean back in their chair, steeple their fingers, and sigh before informing you that, "We can't really be sure, but the answer is somewhere between three and five." An easy joke that captures the foibles and stereotypes of two fields. The comical set-up makes light of the indisputable fact that presenting identical evidence to qualified professionals in separate disciplines rarely guarantees that you will receive identical answers. While the discrepancy lends itself well to groan-worthy jokes or attempts to goad your civil engineer uncle on at Christmas dinner, the complex relationship between geology and engineering creates a challenging landscape marked by pitfalls and triumphs alike that we must repeatedly traverse over the course of our professional endeavors. A recent article in *The Professional Geologist*, reprinted here with the generous permission of the American Institute of Professional Geologists, explores this divide as it pertains to geotechnical work and proposes useful mitigation techniques that should be relevant all geologist regardless of specialization. A special thanks to AIPG and the authors for allowing us reprint the piece in modified format here in the *NOGS LOG*.

Laura

Laura Sorey, *Editor*

NOGS LOG

Contact:
Annette Hudson
info@nogs.org

2016 ADVERTISING RATES

The New Orleans Geological Society was formed in 1941, with an initial membership of only 55. It has always been an active professional society and presently has a membership of 500.

AD SIZE	2015 RATE	NEW 2016 RATE!
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Eighth Page (3.75"x2.5")	$600	$300
Twelfth Page (3.75"x1.65")	$375	$188
Note Size (3.75"x.75")	$120	$60

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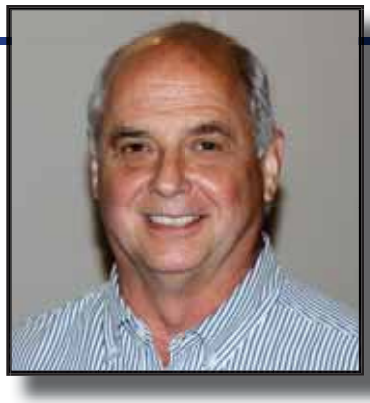

From the President

Another year is drawing to a close, and again it has been a difficult one for those of us in the petroleum industry. Many highly qualified earth scientists find themselves unemployed. Some have found employment in the government agencies or the environmental field, but for others the prospects for employment in the near term are questionable and they are wondering if it's time to leave the profession. It's very reminiscent of the late 80s and early 90s when the last major downturn occurred.

As one who survived that earlier downturn and continued on to retirement, I know how fulfilling a career in the oil patch can be. But it's difficult to stay in the field you love when there is no paycheck. Deciding whether it is better to wait until conditions improve or to change professions is an individual decision. If you are now making that decision I would offer the following advice: stay involved with the industry, network and make new contacts, and do what you can to make yourself more marketable. This downturn will end, as they always do. Meanwhile, NOGS is here to do what I can to help. NOGS cannot offer you a paycheck or a job, but we do have abundant opportunities for networking and taking part in petroleum-related activities. Use NOGS to help you get through this.

The NOGS Fall Field Trip, led by Mike Merritt, was held on October 29 and was fully subscribed at 32 participants, including me. We were treated to a seldom seen view of the West Bank flood protection system. It was a great trip - highly informative, very relevant, and well-organized. We hope to run it again next year.

I attended the API Intersociety Luncheon today and Marc Ehrhardt from the Grow Louisiana Coalition spoke about the value of the oil industry to Louisiana and its citizens. He emphasized the need for us as an industry to be more proactive in raising public awareness about this. The coalition is an advocacy group with over 22,000 members and whenever they approach state officials to speak on behalf of our industry they can point to that number to help drive home their point. Membership is free, so if you might be interested in joining the organization, you can check them out at growlouisianacoalition.com. I did and decided to join.

On Friday, December 16, NOGS will hold its annual Christmas Holiday party at the home of Cathy and Mark McRae at 1347 Moss St, New Orleans, LA. Everyone who attended last year's party thought it was a wonderful event with great food and lots of fun. Thanks to the generous sponsorship of a number of companies and individuals we are able to offer this to our members for only $35 per person, $25 per student, with the first 20 students free thanks to the generosity of the McRae's. I would also like to single out Tim Klibert of Diversified Mudlogging for his very generous gift. The party is a great opportunity to talk to people that you may have seen at meetings but never spoken with. It's also a non-technical time, so we get to learn a little bit more about each other outside of our common interest in geology. There will be great food, fine refreshments, and wonderful camaraderie. Try to attend the party; I am sure you will enjoy yourself.

I wish all a safe and happy holiday season and look forward to seeing you at the party.

Al Melillo

THE NEW ORLEANS GEOLOGICAL SOCIETY

NOGS Office

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Phone: 504-561-8980 • Email: info@nogs.org • Website: www.nogs.org
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UPCOMING

December 5 • NOGS Luncheon

Holiday Inn Downtown Superdome

$3.00 validated parking in hotel garage

Presentation:

Preservation of the Baton Rouge Aquifer

Guest Speaker:

A. Hays Town, Jr.

Town Construction Co. (retired) • Baton Rouge, Louisiana

See pages 8 & 9 for Abstract and Biography

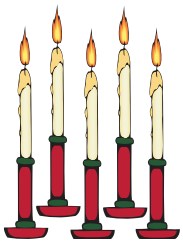
HOLIDAY INN DOWNTOWN SUPERDOME
Check with concierge or
front desk for location.
Lunch served at 11:30 am

ADMISSION:
With reservation..... $30.00
Without reservation $35.00
Student Member with reservations..... FREE

December 8-9
35th Annual GCSSEPM-FNDTN
Perkins-Rosen Research Conference
"New Progress in the Science and Exploration of the GoM Basin"
Marathon Auditorium • Houston, Texas
For more info: www.gcssepm.org

January 9
Joint NOGS/SGS Luncheon
Speaker: Terry Wallace • Los Alamos National Laboratory
Holiday Inn Superdome • New Orleans, Louisiana
For more info, contact Annette at annette@nogs.org or 504-561-8980

December 16
NOGS Holiday Christmas Party
7:00 p.m. to 10: p.m.



Home of Catherine & Mark McRae
1347 Moss St. • New Orleans, LA
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See inside front cover of this issue
for more information.

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Dec. 5 NOGS Luncheon Presentation

☆ ☆ ☆ at the Holiday Inn Superdome ☆ ☆ ☆

Preservation of the Baton Rouge Aquifer

Presented by

A. Hays Town, Jr.

Town Construction Company (retired)

Baton Rouge, Louisiana

ABSTRACT

In 2009, Town, son of the acclaimed architect, was busy reinventing himself. After a long and successful career as a contractor, the 1958 LSU alum enrolled in graduate school at his alma mater. "I wanted to learn about the weather," he says. "That's why I went back."

As with so many students, however, once on campus his goals took a detour. During a class on hydrology, he first heard about saltwater intrusion. "I thought I would research it for a term paper, so I went out to the U.S. Geological Survey, and it was obvious. I knew within the first hour of looking at the charts and graphs they gave me that there was a problem."

Ironically, the problem is rooted in our water's great qualities. Water from the Southern Hills Aquifer is almost completely mineral free. Think super-soft. That means it is perfect for everything from lathering up a bar of soap to making clean steam in a massive boiler.

Local industry is possible largely because of this simple geo-economic fact: a no-cost competitive advantage is yours for the taking if you can drill a well deep enough to tap into it. Of the hundreds of wells scattered around the parish, the majority are clustered in the north Baton Rouge industrial district, and they draw half of all the groundwater used locally.

As water is withdrawn from the aquifer, however, super-saline groundwater is pulled northward through a subterranean barrier called the Baton Rouge fault. (You may have wondered about that abrupt hill on College Drive or by City Park—that's the surface of the fault line.) Each passing day salt water creeps nearer to both industrial and public supply wells. The faster water is pumped out of the ground the sooner local wells begin to turn salty.

The science of groundwater became Town's obsession, but he also wondered about the impact for Baton Rouge. The more he learned about the looming decline in safe drinking water, the more concerned he became.

Three years ago Town led the formation of an advocacy group called Baton Rouge Citizens to Save Our Water, Inc., and he began calling elected officials, industry representatives and anyone else who would talk to him about the issue. So far, the group's media campaign has included the launch of a website—savebrwater.com—and a series of television public service spots. At his urging last year, the Metro Council and the Capital Region Legislative Delegation requested the Capital Area Ground Water Conservation Commission (CAGWCC) hold public meetings on the issue of saltwater intrusion. The meetings were packed.

**Note: Abstract excerpted with permission from [225] Magazine*

BIOGRAPHY

Hays Town, Jr. was born and raised in Baton Rouge. He owned and operated Town Construction Company until his retirement. Hays was active on many fronts in the building industry as he was the founding president of the Associated Builders & Contractors Baton Rouge Chapter, served as president of the Associated Builders & Contractors Louisiana Chapter, and was Chairman of the Louisiana State Licensing Board for Contractors. Not surprisingly, he received the "National Man of the Year Award" from the Associated Builders & Contractors organization. Mr. Town served in the US Army Reserve as an Infantry Officer. He holds a BS in Civil Engineering from LSU (1958) and an MS in Geography (2012), also from LSU. Hays has been active in many civic organizations in his home town, including serving as president of the first Montessori School, founding president of the St. Elizabeth Foundation, and served as Chairman Louisiana State Child Care Committee. He received the "Angel of Adoption Award" from the US Congress and also the "Quality of Life Award" from the Baton Rouge Growth Coalition. Hays is a member of the Board of Directors of Greenarmy, Inc., and most importantly, he is the Founding President of Baton Rouge Citizens to Save Our Water.

THE DEC. LUNCHEON RESERVATION DEADLINE IS DEC. 2 - CONTACT THE NOGS OFFICE

"And Looking Ahead . . ."

The next luncheon will be held on January 9 and will be the Joint NOGS/SGS Luncheon. Our guest speaker will be Terry Wallace of Los Alamos National Laboratory. Contact the NOGS office at 504-561-8980 or use the PayPal link at www.nogs.org to make your reservation.

CALENDAR OF EVENTS: DECEMBER — JANUARY 2017

If you know of upcoming seminars or academic events that may be of interest to our members, please email the event details to Laura Sorey at nogseditor@gmail.com to be included in the monthly calendar.

2016	EVENT	LOCATION	CONTACT / INFO
5 Dec	**NOGS Luncheon Hays Town, Jr. Town Construction Co. (retired) Preservation of the Baton Rouge Aquifer**	Holiday Inn Superdome	annette@nogs.org or 504-561-8980
8-9 Dec	Perkins-Rosen Research Conference "Mesozoic of the Gulf Rim and Beyond: New Progress in the Science and Exploration of the Gulf of Mexico Basin	Houston, Texas	www.gcssepm.org
9 Dec	BRGS Luncheon	Baton Rouge Mike Anderson's Seafood	lisapultz@cox.net
13 Dec	Final Date for Submission of PG/GIT Applications to Louisiana Baord of Professional Geoscientists for Spring 2017 ASBOG Exam		See box below for more details
16 Dec	**NOGS Holiday Christmas Party 7:00 pm to 10:00 pm**	1347 Moss Street New Orleans, LA	See page 2 for more details
25 Dec	*Christmas Day*		
1 Jan	*New Year's Day*		
5 Jan	*Twelfth Night* *Start of Mardi Gras*		
9 Jan	**Joint NOGS/SGS Luncheon Terry Wallace Los Alamos National Laboratory Topic: TBA**	Holiday Inn Superdome	annette@nogs.org or 504-561-8980
13 Jan	BRGS Luncheon	Baton Rouge Mike Anderson's Seafood	lisapultz@cox.net

2017 ASBOG Exam Information

The Louisiana Board of Professional Geoscientists will proctor the ASBOG Fundamentals of Geology and Practice of Geology exams on March 17, 2017.

LBOPG must receive your application (including references and official transcripts) for GIT certificate or PG License for approval by the board when they meet on December 13.

The LBOPG Proctoring/Verification application and fee must be received by LBOPG by December 31, 2016 in order to sit for the March 17, 2017 exam. Note: you must have a pending GIT certificate or PG license application and relevant fees submitted prior to submitting the application for proctoring.

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October 14-16, 2016

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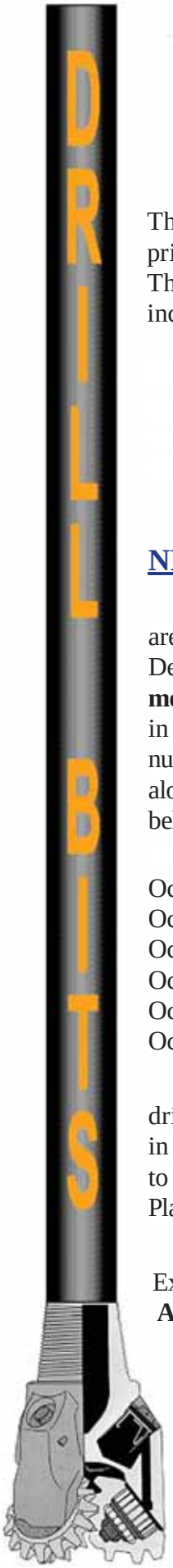
NOGS FALL FIELD TRIP

Saturday, October 29, 2016

The morning of Saturday October 29, Mike Merritt of Southeast Louisiana Flood Protection Authority-West (SLFPA-W) led NOGS members on a field trip to visit key sites in the New Orleans metro area flood defense system and led discussions on the geologic factors influencing the integrity of those defenses. Mr. Merritt, a professional geologist about to conclude his term as a SLFPA-W commissioner, is an outspoken proponent of incorporating detailed geologic assessments into public works projects like the levees and pump stations visited during the field trip. A broad mix of students, professors, and professionals benefitted from Mr. Merritt's rich base of knowledge and learned about the role of levee boards like the SLFPA-W, the challenges of designing adequate hurricane and river flood protection, and how the failures of the past influence the plans for the future. A more detailed accounting of Mr. Merritt's work and the geological issues facing flood control can be seen in an upcoming issue of the *NOGS LOG.*



South Louisiana and Offshore Gulf of Mexico Exploration and Production Activities

LAFAYETTE DISTRICT, ONSHORE AREA

By Kevin Trosclair and Carlo C. Christina

The Baker-Hughes United States rig count for the week of October 28 was 557 rigs, up 35 rigs from the prior month. Rig activity in the U.S. has gradually increased from a low of 404 rigs in May of this year. The Louisiana rig count (not including the OCS) averaged 26 rigs for the month of September, a slight increase from 23 rigs the prior month.

North Louisiana Rigs: 18
South Louisiana Rigs: 8
Land 6
Inland Waters 2

NEW LOCATIONS

New Locations for the Drill Bits monthly report are selected from the permits as filed with the Department of Conservation. During the entire **month of October 2016, only 3 permits** to drill in South Louisiana were filed. By comparison, the number of permits filed during the past 5 years, along with the price of oil at that time, is shown below.

	Number of Permits	Price of Oil
October 2011	49	$110
October 2012	35	$115
October 2013	30	$115
October 2014	38	$90
October 2015	7	$50
October 2016	3	$45

Of the 3 new permits filed one was a permit to drill a well to 7850 feet in Beckwith Creek Field in Calcasieu Parish, and the second was a permit to drill to 9570 feet in East Black Bay Field in Plaquemines Parish.

The most interesting permit was filed by Dunn Exploration Company to drill a deep test in **Abbeville Field**, (A), Vermillion Parish. The #1 City of Abbeville, (SN 249851), will be drilled in Sec. 57, 12S-3E, to a depth of 16,000 feet on the extreme southeast flank of the old field to test the Het section. Abbeville Field was discovered in 1936 and has had more than 470 wells drilled in the field. The nearest production is a gas well approximately 1½ miles to the northwest. Dunn Exploration has been the most active operator in recent years having 10 producing wells and 4 shut in wells.

COMPLETIONS

In Tangipahoa Parish, **Greenlaw Field**, (B), Halcon Louisiana Operating has completed its **Tuscaloosa Marine Shale** well flowing **845 barrels of oil per day** and a small amount of gas through perforations 11,930 to 17,904 feet which were fracked. The #1 Franklin, (SN 248552), was drilled in Sec. 53, 1S-7E to a total depth of 17,960 feet, in a horizontal leg measuring 6570 feet from the surface location. The well spudded in December 2014 and was shut down between February 2015 and September 2016 when it was completed.

THE TUSCALOOSA MARINE SHALE TREND-- A REVIEW

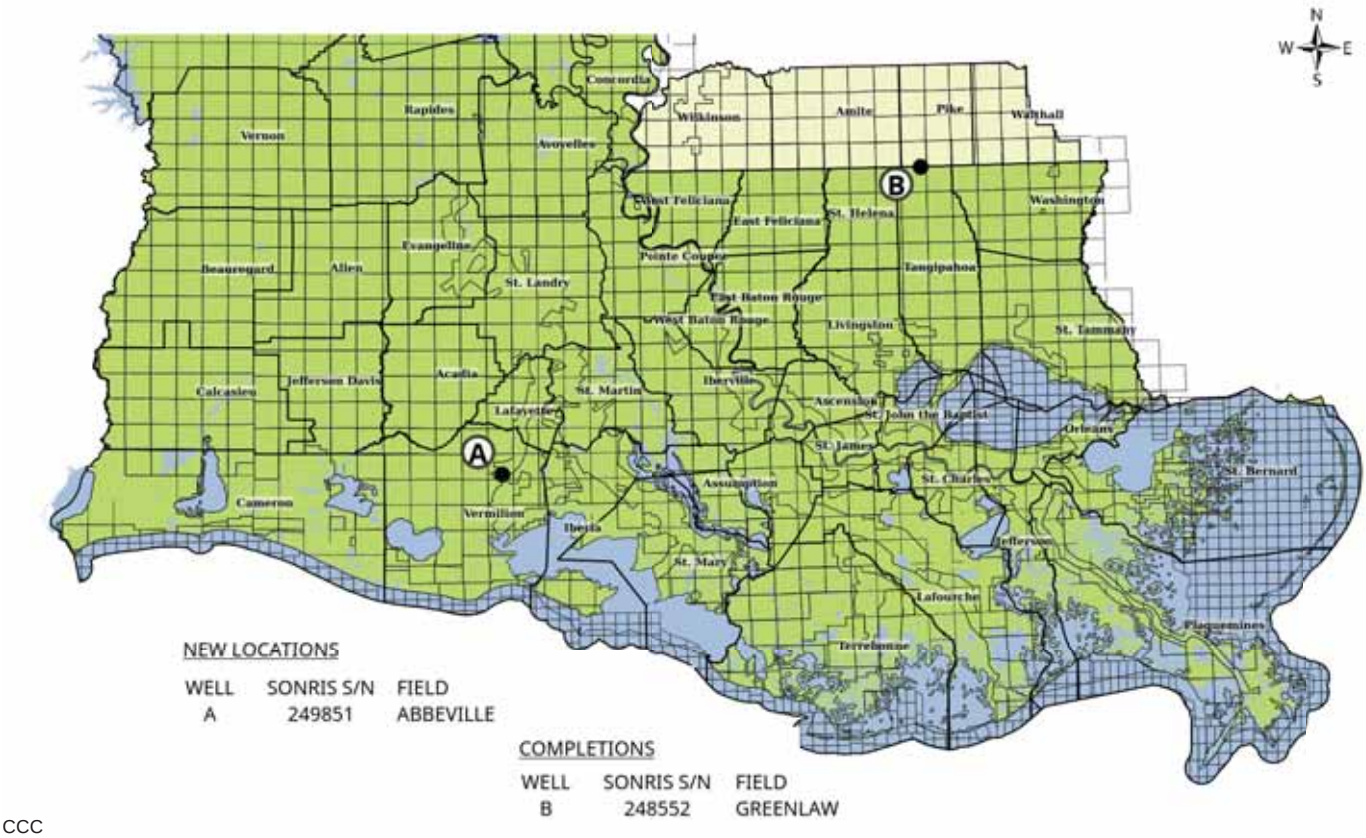
THE GOOD, THE BAD AND THE UGLY

A review of activity within the Tuscaloosa Marine Shale Trend **in South Louisiana** reveals the following: (NOTE--Several TMS wells are producing in adjoining Mississippi Counties.)

THE GOOD:

In South Louisiana, in the 5 Florida parishes, in addition to Avoyelles, Rapides and Vernon parishes, 26 wells were completed in the Tuscaloosa Marine Shale in 15 fields. The 5 principal operators were Goodrich Petroleum, Encana Oil & Gas, Halcon Louisiana, Fortune Resources and Indigo Minerals.

SOUTH LOUISIANA ACTIVITY MAP
DECEMBER 2016



PARISH	FIELD	WELLS	STATUS
Washington	Little Silver Creek	2	shut in pending perf/frack
Tangipahoa	Little Silver Creek	5	producing
	Kentwood	1	producing
	Fluker Field	1	producing
	Greenlaw	1	producing
St. Helena	North Chipola	3	producing
East Feliciana	Beech Grove Plantation	2	producing
	Richland Plantation	1	producing
	North Chipola	1	producing
West Feliciana	Baker Creek	1	producing
	Spillman	1	producing
Avoyelles	Bayou Twisty	2	producing
	Vick	1	producing
	Lake Roseau	1	producing
Rapides	Flatwoods	1	producing
	Roxana	1	producing
Vernon	Burnstown	1	producing

THE BAD:

The Tuscaloosa wells in these 15 fields have produced approximately 3 million barrels of oil.

THE UGLY:

Goodrich Petroleum, the biggest player in the TMS Trend, **filed for bankruptcy** in April 2016. The company held more than 300,000 acres in the Trend and operated 14 producing wells. Goodrich listed debts of $507 million and sought protection to eliminate $400 million of that debt.

Other companies holding interests in the TMS Trend filing for bankruptcy included Halcon Resources and Sanchez Energy.

OFFSHORE GULF OF MEXICO

SHELF AND DEEPWATER ACTIVITIES

by Al Baker

During **October 2016**, the BOEM approved **56** Gulf of Mexico drilling permits. Of these, **6** were for shelf wells and **50** were for deepwater wells. Of the total number of permits, there were **3 new well permits**, all issued in deepwater. This is the third month in a row that no new well permits were issued on the shelf.

The three new deepwater permits were for **exploration wells**. Two exploratory well permits were granted to **Shell Offshore** for their **Mississippi Canyon 566 #2** and **567 #1** wells. The other exploratory permit was awarded to **LLOG Exploration Offshore** for their **Mississippi Canyon 895 #1** well.

On October 28th, **IHS-Petrodata** reported that the Gulf of Mexico mobile offshore rig supply stood at **104** which is **1** more than last month. The marketed rig supply consisted of **49** rigs, of which **36** were under contract. The marketed contracted versus total rig supply utilization rate is **34.6%**, while the marketed contracted versus marketed supply utilization rate stands at **73.5%**. The marketed rig supply number is **1** more than last month, and the contracted rig supply number is **2** more than last month. In contrast, the October 2015 fleet utilization rate stood at 60.2% (versus 47.1% today) with 71 out of the 118 rigs under contract.

As of October 28th, **BakerHughes** indicated that there were **21** active mobile offshore rigs in the Gulf of Mexico, which is **58.3%** of the rigs under contract mentioned above. This active rigs number is the same as reported last month. Of the 21 rigs, **3** are located on the **shelf** and **18** are situated in **deepwater**. The current active rigs count compares to 32 active rigs during the same period last year, representing a **34.4%** drop (minus 11 rigs) in yearly rig activity.

As of October 30th, the **BakerHughes** total U.S. rig count stood at **557** rigs **down 71.2%** from the **September 26, 2014 high** of **1931** rigs. At this time a year ago, the rig count stood at 775 rigs. Of the current 557 rigs, **441** are **oil rigs** and **114** are **gas rigs**.

On September 30th, the **BOEM** reported the initial results of their Phase 2 evaluation of the bids received in the **Western GOM OCS Sale 248** held on August 24, 2016. Of the 24 bids received, **7** were deemed acceptable. The BOEM has until November 22nd to either accept or reject the remaining 17 bids.

On October 5th, **BHP Billiton** announced that it had found multiple oil horizons at the **Caicos exploration well** in the deepwater Gulf of Mexico. The discovery well is located at **Green Canyon Block 564** and was drilled to a **total depth** of **30,803 feet**. The well is one of several Miocene discoveries in the central Gulf of Mexico. With the recent success at Caicos and Shenzi North (August 2015), the company is optimistic for commercial development in the area. Next month, BHP will drill the **Wilding exploration well** in a block adjacent to the Caicos discovery.

The NOGS Holiday Christmas Party

will be held at the home of

Catherine and Mark McRae

1347 Moss Street • New Orleans, Louisiana

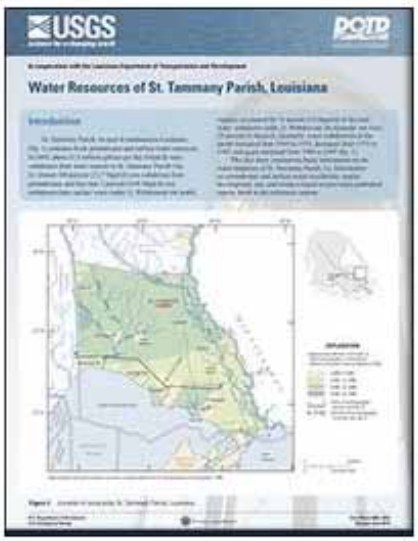
Note: there are stairs leading up to the entrance of the home, but some NOGS members will be on hand should any party goers need assistance climbing the stairs. Also, if street parking is a concern due to accessibility reasons, please let one of the greeters know, and they will be able to assist you. See inside cover for party details.

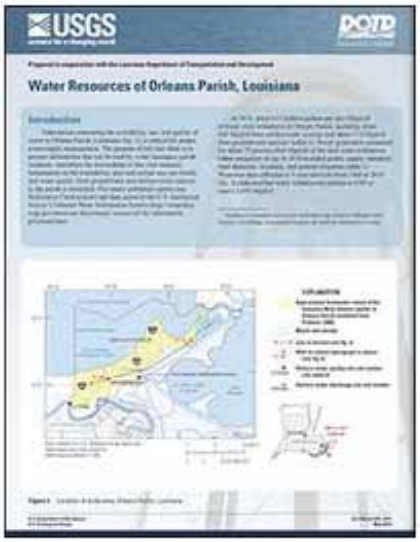
USGS Water Resource Information – Parish Fact Sheets

The note below is from the USGS website.

The USGS is summarizing basic information on water resources for each parish in Louisiana and presenting the information in fact-sheet format. Information presented includes groundwater and surface-water availability, quality, development, use, and trends. These brief summaries of water resources will provide parish officials, local officials and concerned citizens with information needed to make decisions about current and future development in their parish. So where can you get your hands on this great resource?

http://la.water.usgs.gov/ParishWaterResources.html





What do you mean moisture is 110%?!

Twenty roadblocks to communicating engineering geology

J. Barry Maynard, Mark T. Bowers, Paul E. Potter

Introduction

Like most disciplines, in the geological sciences there is an unfortunate tendency to write papers and reports as though the information will only be read by those initiated into the culture and practices of their own group. This is the source of the consternation expressed in our title, when we encounter an unfamiliar culture, in this case geotechnical engineering. These cultural boundaries give rise to countless examples of confusion in communicating, sometimes with tragic consequences.

A seminal work that analyzes issues of poor communication is the book by Robert Graves and Alan Hodge "The Reader Over Your Shoulder" first published in 1943 in the UK and in a 1971 US edition with many reprints. They urge writers to constantly keep in mind the members of their audience, imagining their complaining about confusing sentences or undefined jargon. In the same spirit we urge geologists to write with a wider audience in mind rather than other geologists. To facilitate this broader approach to writing, it is essential for geologists to realize and appreciate some of the subtle but important distinctions in the way geologists and other scientists and engineers use seemingly identical terms.

It may seem an annoyance to have to carefully explain what would seem to be understood by every geologist, but this body of assumed knowledge does not extend outside of geology and worse, many terms that look familiar are in fact used in surprisingly different, even opposite ways. This potential for a breakdown in communication is great. Mitchell, in his 2004 Seed Lecture (Mitchell, 2009), identified communication, in particular the failure to adequately define terms and conditions, as the number one reason for geotechnical failures.

The Engineer Over Your Shoulder

The most common hand-off of information is probably between geologists and civil engineers, for example in the investigation of a prospective site for the opening of a mine or the construction of a dam, a building, a landfill, or a roadway. These two specialties have different traditions and different training (Hatheway, 2005); hence their approaches to the problem are different. Ideally, these approaches should be complementary and reinforce one another but differences in communication often arise and may seriously interfere with the successful completion of a project.

In most instances geological study precedes detailed engineering investigation (e.g. Leggett, 1939, 1962, 1979). There is a handoff of information, sometimes occurring over a wide time gap, between the geologist and the engineer or the environmental scientist. It is therefore incumbent on the geologist to prepare information in formats and in terminology that are comprehensible to other disciplines.

In the words of Kiersch and James (1991, p. 555), "Many engineers...are confused by geologic reasoning and terminology, are prone to discredit geologic reports, and can regard them to be of little practical value. Likewise, geologists have failed to present their findings in language understandable to the intended readers, and to explain the significance of a geologic feature or setting."

Serious mistakes are too commonly made. The catastrophic failures of the refuse piles at Aberfan in Wales (Penman, 2000) and the Stava tailings dams in Italy (Chandler and Tosatti, 1995) were a result of siting these facilities on top of known springs. The failure of the Malpasset Dam in France was related to insufficient understanding of planes of weakness in metamorphic rocks (James, 1988). The Portuguese Bend landslide complex in southern California that continues to destroy new houses and golf courses was mapped as landslide terrain by the US Geological Survey as early as 1946 (Hill et al. 2007).

Twenty Ways to Miscommunicate Geology to Engineers

These communication failures stem from two sources: differences in vocabulary and differences in data formats, specifically spatial vs. digital data. We address the differences in vocabulary herein. Table 1 lists 20 of the most confusing English-language terms used by geologists and geotechnical engineers. Of these, it strikes us that eight are especially likely to cause misunderstanding (marked in bold) and therefore merit further discussion.

1. *Grain Size Distribution or Grading*

This is perhaps the most vexing vocabulary discrepancy because the boundaries between the size categories are slightly but significantly different, the method of representation of the data is opposite, and the qualifiers used to describe the distribution have opposing senses. Thorough discussions of grain size analysis in geology are still best found in the classic book by Krumbein and Pettijohn (1938). For engineering, Hunt (2005) is an invaluable resource.

The boundaries for grain size categories used by geologists come from the Wentworth classification, whereas engineers follow the ASTM classification (ASTM 2009). Consequently, when a geologist refers to "sand," the material has a grain size between 0.0625 and 2.00 mm; in the ASTM scheme, the range is 0.075 to 4.76 mm. The difference can be significant. Voight et al. (1981) reported grain size in both systems for debris avalanche deposits of the 1980 eruption of Mount St. Helens and found that sand-sized grains averaged 42% using the Wentworth classification but 52% using the ASTM classification.

The method of representation of choice for both disciplines is a cumulative frequency curve, but it is customary to show percent (%) finer in one case and percent coarser in the other. Furthermore, because a sand with a wide range of grain sizes makes a better foundation, an engineer refers to it as "well graded,"

provided the fine fraction does not exceed 5%. Conversely, because the same sand shows reduced permeability compared to sand of the same median size with a narrow range of sizes, a geologist refers to it as "poorly sorted." Even more confusing, geologists speak of a bed or bed sequence as being *graded* if it shows consistent vertical trends in grain size whereas in engineering *gradation* refers to the grain size distribution of a single sample.

Confusion can also arise in describing the finer sizes. Geologists tend to concentrate on mineralogy and to divide fine-grained materials into silt and clay on the basis of size, and to further subdivide clay-sized material into clay and non-clay minerals. Engineers rely more on physical behavior, namely plasticity, and divide silts and clays using the Atterberg limits into low-plasticity (ML and CL) and highly plastic (MH and CH) fines based on the material's position on the plasticity chart. Kehew (2006) provides a helpful reference for geologists hoping to improve their grasp of geotechnical basics such as the Atterberg limits.

One might argue that the engineering approach to soils is their business and of no concern to geologists; however, consider the data shown in Fig. 1. The data represent a glaciated area in Greater Cincinnati that has experienced repeated landslide movement on some tracts, but has stable soils on other adjacent properties. Much of this behavior seems random to developers and their engineering consultants. Geological reports tend to speak in terms of Wisconsinin vs. Illinoian deposits and to focus on genetic features such as kame terraces because of the potential for gravel resources. But the information and the effectiveness of communicating could be increased if the geologist includes a few Atterberg limits so the soils also can be classified in the engineering approach as well. If this engineering information were included, the engineer could see at a glance that there is a group of soils (the lake bed clays) at this site that needs to be avoided or at least be given extra attention. Figure 2 illustrates the

Table 1. Pitfalls in Word Usage

Concept		Geology	Civil Engineering
1.	Cementation	Binding together of particles of a soil or sediment by precipitated minerals	Injection of cementing agents into permeable or fissured soil or rock to reduce fluid flow or improve strength
2.	**Clay**	Rock or mineral fragment < 4 μm; in soil science, the limit is 2 μm, the size below which all particles are *clay minerals*	Plastic material consisting mainly of particles finer than 2 μm
3.	Compaction	Volume reduction from overburden pressure	Densification by mechanical means
4.	Consolidation	Lithification of a sediment by compaction or cementation	Gradual reduction of soil void ratio from dissipation of excess pore pressure (owing to an increase in effective stress) and in a squeezing of fluids from the soil pores
5.	Dike	A tabular igneous rock cutting across the planar structures of the *surrounding* rocks	Artificial wall or embankment of earth or rock fill
6.	Grade	In mining, metal content of an orebody	Degree of inclination of an engineering structure
7.	Graded	Vertical trend in grain size in a bed or bedding sequence. *Normally graded* is fining-up *Reverse graded* is coarsening-up	Possessing a range of grain sizes
8.	Grain-size units	$\Phi = -\log2(mm)$	US standard sieve mesh sizes; mm
9.	Grain-size distribution	*Sorting:* the degree of similarity of grain sizes of a sediment	*Gradation:* the frequency distribution of sizes of a granular material
10.	Grain-size distribution parameters	*Inclusive graphic standard deviation:* $SD=(\Phi_{84}- \Phi_{16})/4+(\Phi_{95}- \Phi_{5})/6.6$	*Coefficient of uniformity:* $C_U= D_{60}/D_{10}$ *Coefficient of gradation (or concavity):* $C_C = (D_{30})^2/(D_{60}*D_{10})$
11.	**Grain-size distribution quality designators**	Poorly-sorted = wide range of grain sizes	Well-graded = wide range of coarser grain sizes
12.	Grain size distribution qualifiers	< 0.35 Φ very well sorted 0.35-0.50 Φ well sorted 0.51-0.70 Φ moderately well sorted 0.71-1.00 Φ moderately sorted 1.01-2.00 Φ poorly sorted 2.01-4.00 Φ very poorly sorted >4.00 Φ extremely poorly sorted	Well-graded: <5 % fines; C_U > 6 (sand) or 4 (gravel) 1 < C_C < 3 Poorly graded: not meeting the C_U and/or C_C requirements May be uniformly graded or gap graded
13.	**Moisture content**	Weight water/total weight x 100 (also used by environmental engineers)	Weight water/dry weight x 100 (used by geotechnical engineers)
14.	**Permeability units**	Geologists and engineers in the petroleum industry will use *darcys* as the unit of intrinsic permeability	Hydrogeologists and civil engineers will use cm^2 for intrinsic permeability or *cm/sec* for hydraulic conductivity
15.	**Pore space**	*Porosity*: Volume of pores/total volume x 100. In hydrogeology, expressed as a decimal	*Void ratio:* Volume of voids/volume of solids (expressed as a decimal, not a percent)
16.	Rock	Naturally formed consolidated material formed of one or more minerals and having a degree of chemical consistency	Any natural material that requires drilling and blasting or similar methods of brute force for excavation
17.	**Sand**	A detrital particle between 1/16 mm (0.062 mm) and 2 mm. US soil scientists use 0.05 to 2 mm	A soil particle retained on U. S. standard sieve no. 200 (0.074 mm) and passing sieve no. 4 (4.76 mm)
18.	**Silt**	A detrital particle between 1/256 mm (0.004 mm) and 1/16 mm (0.062 mm). US soil scientists use 0.002 to 0.05 mm.	Nonplastic or slightly plastic material exhibiting little or no strength when air-dried consisting mainly of particles passing U. S. standard sieve no. 200 (0.075 mm) yet > 0.002 mm
19.	**Soil**	Unconsolidated earthy materials over bedrock supporting or capable of supporting plant life (includes only in situ material)	Uncemented aggregate of mineral grains and decayed organic matter down to solid rock, along with the liquid and gas that occupy the interparticle spaces (includes in situ and transported material); the corresponding term in geologic usage is *regolith*
20.	Soft	Commonly refers to rocks of sedimentary origin. *Soft-rock vs. hard-rock geology*	Refers to a cohesive soil that can be molded by slight pressure. The opposite term is *stiff* (not commonly used in geology). Non-cohesive soils would be termed *loose or dense*

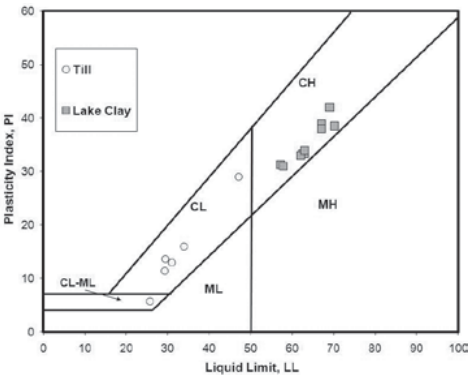


Figure 1. Example of use of plasticity chart to characterize landslide-prone soil material (referred to as soils in Civil Engineering usage, but sediments in Geology).

results of the failure of the geologist to convey the information, or failure of the engineer to consider that information.

Figure 2. Rotational slump in a new highway cut in Cincinnati OH. A series of such slides along this cut initiate in a horizon of lake bed clays. Repeated attempts to remediate the slides by adding gravel cover have failed because the underlying geology has not been taken into account.

2. Proportion of void space to solids

A critical property of a soil or rock is the ratio of the volume of void space to that of solids. Geologists work with *porosity* expressed in percent and signified by Φ in petroleum geology or as a decimal fraction represented by *n* in hydrogeology (note that phi in geotechnical engineering is used to represent the internal angle of friction). On the other hand, civil engineers work with *void ratio* (using e as the symbol) but may also use porosity in the decimal form. Porosity refers to the ratio of pore volume to the total volume of rock or soil, whereas void ratio refers to the ratio of the pore volume to the volume of solids alone. The terms are readily converted:

$n = e/(1+e)$; $\Phi = n*100\%$

$e = n/(1-n)$

where n is expressed as a decimal fraction.

The potential for confusion is limited because the terms for the two systems of measurement are completely different.

3. *Proportion of water to solids*

The ratio of the mass of fluid to that of solids in a material, the *moisture content* when the fluid is water, has parallel differences between the two disciplines but the vocabulary terms are not different and confusion is common. Geologists use the ratio of fluid weight to total weight, whereas civil engineers use fluid weight to solids weight. In other words, geologists report moisture as a percentage of the weight of the sample as received; engineers report the percentage of the dry weight. A sure sign that a report is using the civil engineering definition is the appearance of values higher than 100 %.

If we define for convenience *m* as the moisture content in the geology sense and *w* as water or moisture content in the engineering sense,

$w = m/(1-m)$ or $m = w/(1+w)$

In both the geologic and engineering styles of measurement, the *direction* of these metrics is the same, the units are the same (dimensionless) and the variable used is superficially similar. However, critical differences are present. Each discipline needs to be sensitized to the likelihood of confusion and make it perfectly clear which convention is being used in every report, otherwise the reader will have difficulty knowing which system is being specified. Although it may seem redundant and be resisted by editors, it is our opinion that a good report or paper will include tables with both sets of variables.

Consider the infamous Aberfan flow slide. The liquid limit for the material in the waste tip proved to be 26.5% (Bishop, et al., 1969). The moisture content, when measured as percent of dry weight as is the case for comparison with the liquid limit, was 23-25%. This number was so close to the liquid limit it should have alerted the authorities to the imminent danger of liquefaction. However, if the moisture were expressed in the geologic sense as percent of total weight, the value would be only 19-20% and would convey a false sense of security. This emphasizes again that the terms and the units are the same, so unless the definition of the parameter is carefully stated, this value might be regarded as safe.

4. *Permeability*

Of the many properties of a rock or a soil, arguably the most important is permeability because it exerts the greatest influence on the movement of fluids and on pore pressures. It is notoriously difficult to evaluate permeability because it covers such a wide range and is so variable on a small scale. Litigation involving groundwater is likely to turn on widely different estimates of permeability by the experts on opposing sides.

Different schemes of measurement, different units, and subtly different symbols are used by petroleum engineers, geotechnical engineers, and hydrogeologists (Table 2). This practice is likely to cause each discipline to ignore or misinterpret data generated by the others. In most cases, there should be little danger of confusion if the units are carefully expressed, but there is a tendency to use K and "k" in the opposite sense in geotechnical and hydrogeologic notation.

Table 2. Measures of the Ability of Soil or Rock to Transmit Fluid

Term	Units	Symbols	Synonyms
Measures that depend on the properties of the liquid as well as the solid			
Hydraulic conductivity	L/T	K (hydrogeology)	Field coefficient of permeability (obsolete)
Permeability coefficient	L/T	k (Geotechnichal Engineering)	
Measures that depend only on the properties of the solid medium			
Permeability (petroleum geology and engineering)	darcy	k	1 darcy = 9.87×10^{9} cm^2
Intrinsic permeability (Hydrogeology and Engineering)	L^2	K (Geotechnical Engineering) K_i (hydrogeology)	Specific permeability,
Effective permeability (permeability to one fluid phase – oil, water, or gas -- when others are also present)	darcy	oil k_{eo} water k_{ew} gas k_{eg}	
Relative permeability (effective permeability normalized to a reference single-phase permeability)	percent or decimal	oil $k_{ro} = k_{eo}/k$ water $k_{rw} = k_{ew}/k$ gas $k_{rg} = k_{eg}/k$	

5. *Definition of soil*

The definition and classification of soils have a great potential for confusion as pointed out by Leggett (1953), who suggested that geologists adopt the engineering usage. Since this has not come to pass, clarity about differences in usage is needed. It is helpful to consider soil and soil classifications in terms of the purpose of the investigator. We identify five contrasting approaches to soils that

have application in geology and geotechnical engineering.

Geomorphology: "What is the age of the surface that I am studying?" In this approach the material might be mapped as Sangaman, pre-Sangaman, etc. But engineers often find the geological fixation with age frustrating and are prone to dismiss reports in which this aspect is highlighted. The geologist needs to convey the physical consequences of greater age such as more leached soils or devitrification of volcanic ash (e.g. Mitchell, 2009).

Climatology: "Under what climate system did this material form?" In this context the soil science terminology of the U.S. Natural Resources Conservation Service (NRCS) (1999) is likely to be used by geologist, and the material might be appropriately designated as a caliche or a vertisol.

Mineral exploration: "What can the soil tell me about the composition of the underlying rocks?" In this application it is common to analyze B-horizon samples taken in a grid for Au, Ag, Pb, Zn, etc. as an indicator of underlying hidden mineralization. In this context, the distinction of transported vs. in situ material assumes critical importance.

Geotechnical Engineering: "What can I build on this material or what modifications are needed to make it suitable for building?" Here the system of classification is quite different and is likely to be confusing to the geologist.

Agronomy: "What can I grow in this soil?" In this case "soil" is the unconsolidated mineral or organic material on the immediate surface of the earth that serves as a natural medium for the growth of plants. How different soil types are distributed has been a major focus of the U. S. NRCS, resulting in an exceptionally helpful series of maps and reports grouped by county. Many useful geological and geotechnical properties are tabulated and certain soil types can be correlated to slope instability or to drainage problems. Most professionals consult these tables early in a site investigation. The information provides a useful model of how information can be effectively communicated.

Just as with other properties it is critical to explain what convention is being used in reports and on maps. Geologists need to use qualifying descriptions by referring to "in situ" soils and should include specific definitions of size terms. It is not safe to assume that users will understand "silt" and "clay" because many users will not be geologists and will interpret these terms differently from the intention of the report.

Some additional papers that explore the issues of communication are Judd (1967) on construction projects; Kiersch and James (1991) on dams and embankments; Katzenbach and Bachmann (2004) on site investigation; and Hart (2011) on communication among geophysicists, geologists, and engineers. Turner (2008) has provided a wide-ranging review of the intersection of geology and civil engineering since antiquity.

Conclusions and Recommendations

It is tempting for the geologist to regard failures in construction or excavation as the failure of the civil engineer to consider geologic factors. We opine instead that it is the geologist who has failed to communicate the existence and importance of these factors. Because the flow of communication is almost always downstream from the geologist to the engineer, the bulk of the responsibility falls on geologists to clearly convey the significance of their results to engineers.

- Vocabulary, particularly the conflicting terms, needs careful definition to the extent that may seem excessive to most editors.
- Certain measurements such as clay content, moisture content and proportion of voids should be reported in both systems.
- Geological maps and reports should consider a wider audience and, like the Soil Survey Reports, include more information relevant to engineering such as Atterberg limits and slake durability.

Finally we urge the reader to study the paper by Voight et al. (1981) on the characteristics of the debris generated by the 1980 eruption of Mount St. Helens. They present data in both geological and geotechnical formats so that the information is readily understood without confusion by workers in both disciplines.

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Figure 1. Example of use of plasticity chart to characterize landslide-prone soil material (note these are soils in Civil Engineering usage, but sediments in Geology)

Figure 2. Rotational slump in a new highway cut in Cincinnati OH. A series of such slides along this cut initiate in a horizon of lake bed clays. Repeated attempts to remediate the slides by adding gravel cover have failed because the underlying geology has not been taken into account.

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J. Barry Maynard, is Professor Emeritus at the University of Cincinnati, where he taught in the Geology Department from 1972 to 2015 and served as Department head from 1985 to 1990. His focus includes relationships of sandstone composition to tectonics; geochemistry of sedimentary ore deposits; and groundwater contamination.

Barry's interests include communicating landslide hazards to non-geologists, especially real estate professionals. He is a fellow of the GSA and of the Society of Economic Geologists, and is a National Associate of the National Academy of Sciences.

Mark T. Bowers, PhD, PE is an Associate Professor of Civil Engineering and Assistant Dean for Undergraduate Studies in the College of Engineering at the University of Cincinnati where he has taught since 1985. He is the head of the Geotechnical Engineering Program and is a Registered Professional Engineer in the State of Ohio. Mark also has worked as a consulting engineer in Utah and a project engineer in Arizona.

Paul E. Potter, PhD attended the University of Chicago earning degrees in mathematics and geology. He worked for the Illinois Geological Survey and the University of Illinois before joining University of Cincinnati in 1971. After retiring in 1992, he worked in Brazil at several universities and currently is in Cincinnati as Professor Emeritus. He has authored or co-authored seven books on sedimentary geology and has received multiple awards, including AAPG's 2016 Sydney Powers Medal.

Tis the Season...for Giving!

Whether you celebrate faith-based holidays such as Christmas or Hanukkah or simply cherish the holiday season as a time for family and friends, NOGS encourages our members to take the time to remember those less fortunate than ourselves as we enter the holiday season. Many of us have charities or ministries here in New Orleans that we keep close to our heart and support through our presence, our gifts, and our service. If you are looking for a way to support the local community over the coming weeks, here are a few ways to get involved and to hopefully make someone else's holiday a little bit brighter.

Second Harvest Food Bank

no-hunger.org

Second Harvest plans to support families across south Louisiana this holiday season by collecting 110,000 pounds of food and $50,000 between now and December 31 as part of their mission to hunger by providing food access, advocacy, education, and disaster response.

Catholic Charities of New Orleans

ccano.org/holiday/

Catholic Charities serves those who are vulnerable and in need across the Diocese of New Orleans regardless of religion, race, ethnicity or economic status. Consider adopting a family or individual or a family through their Christmas Adoption Program where you provide recipients in need with food baskets, gifts and clothing.

Covenant House

covenanthouse.org/homeless-charity/new-orleans

The Covenant House in the French Quarter provides shelter and a variety of services to homeless, runaway, and at-risk youth under the age of 22. Having aided almost 20,000 kids with vital services, Covenant House reaches out to one of the most vulnerable populations in our nation with absolute respect and unconditional love.

Junior League of New Orleans Diaper Bank

jlno.org/community/diaper-bank/

One in three mothers in the United States faces a daily challenge of filling the basic need of clean diapers for her children. The Junior League of New Orleans works with partner distributors across the metro area to provide clean diapers and other supplies from the JLNO Diaper Bank to support families in-need of these essential child care supplies. You can contribute by making a monetary donation or by donating unused, disposable diapers at any of their drop off locations.

Toys for Tots

new-orleans-la.toysfortots.org/local-coordinator-sites/lco-sites/default.aspx

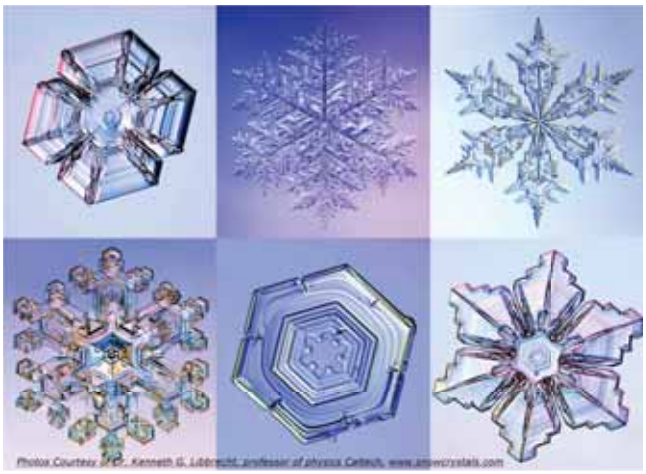
Operated by the United States Marine Corps Reserve, Toys for Tots remains one of the most well-known charitable operations of the holiday season. They collect new, unwrapped toys and distribute those toys as Christmas gifts to less fortunate children in the community with drop-off sites across the city of New Orleans.

We make a living by what we get, but we make a life by what we give.

Winston Churchill

Submitted by Sassan Mouri

The Snowflake Mysteries



It is that time of year. The New Orleans winter is upon us and we must all gear up and put away our shorts, t-shirts and sandals and bust out our jeans, t-shirts, and sneakers.

For some of us who love snow, each year we hope that maybe this is the year that is snows again in New Orleans/Northshore. It is already a rare occasion to see snow fall in New Orleans. In fact, the National Weather Service has recorded only seventeen "snow events" of lasting cover for the city of New Orleans dating back to 1849. The last time it snowed in New Orleans was Christmas 2004.

Snow is rare in the south, but what is even more interesting is each individual snowflake. Did you catch the mistake in the previous sentence? You were just tricked by the author of this article and you did not even realize the trickery. Go back and read the last sentence again. Still missed it, then read on. The correct term is snow crystal, not snowflake. Snow crystals are what you commonly call a snowflake and are water molecules which line up in a precise hexagonal geometry. The saying goes that no two snow crystals are exactly alike. In fact, that statement seems to be true. Each snow crystal's geometry is dependent on the path it travels through the clouds.

But there still is some mystery to your common snow crystal. How does a snow crystal literally just form in thin air? Why and how do we get such different types of snow crystals? Lucky for us, Dr. Kenneth G. Libbrecht, a Professor of Physics at Caltech and Chairman of the Physics Department, is studying this phenomenon.

He has found that multiple factors contribute to the varying crystal structures. In fact, we now understand that the diversity of snow crystals is largely a factor of temperature and the crystal growth rates based on those varying temperatures. It seems to also be dependent on humidity, but science today is still having some trouble explain snow crystal formations in details.

So why do we care so much? Well, Dr. Libbrecht describes it best when he states that understanding crystal structures is part of molecular dynamics. It could eventually lead to better, more advanced crystal structures which would improve semiconductors and lasers. I highly encourage you to visit Dr. Libbrecht's informative and fun website, www.snowcrystals.com, for more info. He even has videos of snow crystals forming.

Alright, now that I have you all caught up on molecular dynamics and crystal structures. Let's continue the magic with fun facts about Santa and the North Pole:

- Santa's sleigh travels at the speed of light. That is about 186,282.4 miles per second, or 671 million miles per hour.
- Santa always gets his suit dry cleaned every Thursday
- Santa loves disco dancing
- Average temperature at the North Pole during the winter -40 degrees Fahrenheit
- Average temperature at the North Pole during the summer 32 degrees Fahrenheit

REFERENCES

http://www.kidsplayandcreate.com/cute-santa-claus-facts-just-for-kids/

http://www.northpole.com/

www.snowcrystals.com

http://www.hallmarkchannel.com/northpole/northpole-fun-facts

http://climatekids.nasa.gov/polar-temperatures/

CALL FOR VOLUNTEERS!

John Curtis Christian School is seeking volunteers to serve as judges for the **2016 Senior Science Fair on December 13th**. The event will be held at 9:00 a.m. If interested in volunteering, contact Mike Fein at 1feinmn1@cox.net.

The New Orleans Geological Society Memorial Foundation, Inc.

The Memorial Foundation is an IRS Tax Exempt Code #501(c)(3) organization. The Federal I.D. is 72-1220999. Please consider making a donation to the Foundation. Your individual support in any amount will help meet the IRS Guidelines for our Foundation. Thanks!

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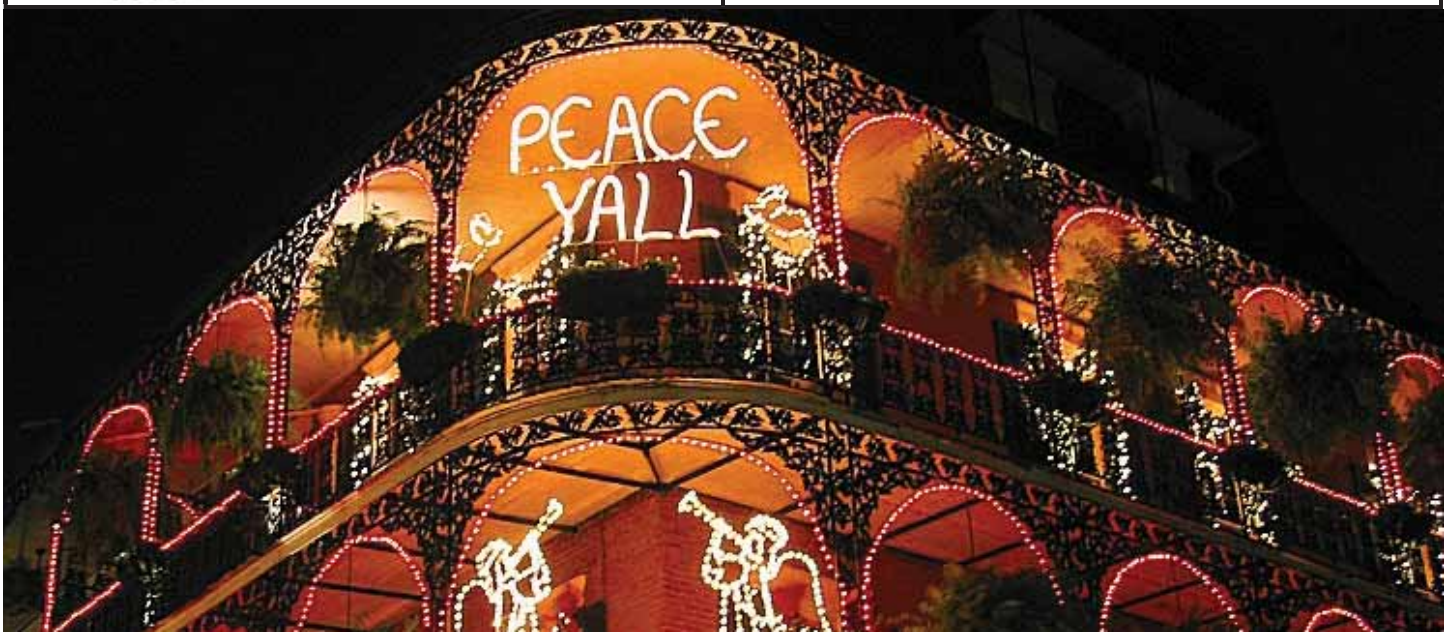



Celebration in the Oaks

This special, month-long light show in City Park hosts hundreds of thousands of colorful lights and illuminated outdoor displays to showcase the holiday season in New Orleans. An annual tradition that began in the late 1980s, Celebration in the Oaks is a family-friendly event that only happens after dark. Over the years it has become one of the most beautiful and popular holiday lighting displays in the country, attracting hundreds of thousands of people annually.

Getting There

Those who arrive by private vehicles will find ample parking on-site to make seeing New Orleans Christmas lights easy. The Celebration in the Oaks tour can only be taken on foot; vehicles are no longer allowed to drive through it. Hours of operation are Sunday through Thursday, 6:00-10:00 p.m., and Friday and Saturday from 6:00-11:00 p.m. (closed December 1-4, Christmas Eve and New Year's Eve).

Tickets

There is a small admission charge for Celebration in the Oaks and children under three are admitted free. Rides are each charged separately and money-saving unlimited ride wristbands can be purchased. You can avoid lines by purchasing tickets ahead of time to see these spectacular Christmas lights in New Orleans at this link. You'll need to print your online tickets and bring them with you.

Dates

This year's Celebration in the Oaks takes place from November 25, 2016 through January 1, 2017. Event is closed on November 28, 29, 30 and December 1, and is closed Christmas Eve and New Year's Eve.

For more information on Celebration in the Oaks, call 504-483-9415, email info@celebrationintheoaks.com or visit their website, www.celebrationintheoaks.com.

Information taken from https://holiday.neworleansonline.com/traditions/celebration-in-the-oaks/



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