JOURNAL OF
Environmental Management
ARIZONA
PRACTICAL AND CURRENT INFORMATION FOR ENVIRONMENTAL, HEALTH AND SAFETY PROFESSIONALS

HOW A LACK OF UNDERSTANDING CHEMISTRY DOOMED FLINT, MI

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CREATING HEALTHY COMMUNITIES AND ECONOMIC GROWTH

BY DAVE LANEY *PG 4*

APR / MAY 2016 Vol 14 No. 2

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INTRODUCTIONS:	Mark Hubbard, and Dr. Nick Hild, ASU
OVERVIEW:	Philip McNeely, Director, MCAQD
PLANNING:	Rule Updates -- Ozone and Beyond; Emissions Inventory -- Where Do the Data Go?
PERMITTING:	Emissions Bank; New Source Review Changes and Modeling
HONEYWELL	How to Conduct an "Air Permit Review", Greg Bopp
COMPLIANCE:	Common Violations; Inspections and Recordkeeping; Enforcement--When can I use the Supplemental Enfocement Program?

LUNCH / NETWORKING

AFTERNOON

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MONITORING	Equipment Demonstrations; New Near Road Monitors; Data Collection and Reporting
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Arizona Environmental Strategic Alliance

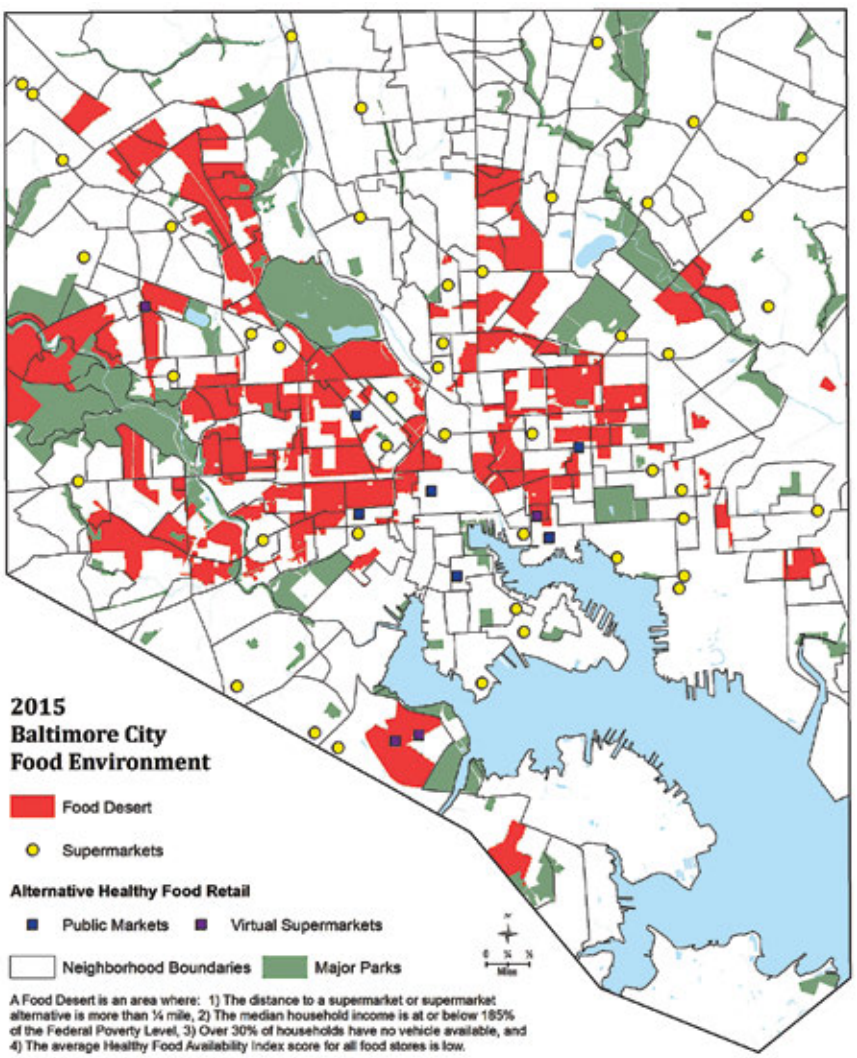
Land Recycling & Other New Tools For:
Creating Healthy Communities & Economic Growth

by Dave Laney

Greensgrow Urban Farm, Philadelphia, PA.
Photo Courtesy of David Barrie, Creative Commons, Flickr.com

The long-term decline in American manufacturing that began in the 1970s has been accompanied by a steady deterioration of infrastructure and a flight to the suburbs of many homeowners and businesses. The result has been areas of stagnation and "slum and blight" in many cities and towns. These are places where unemployment and poverty are high, access to healthy food, healthcare, and basic services are limited and more properties and buildings are vacant/abandoned, underutilized, and/or contaminated. However, redevelopment and reuse of these "brownfield" properties is the key to the building healthy and sustainable communities, and creating economic growth.

It is estimated that there are more than 450,000 brownfield properties in the U.S. It doesn't take much to identify these properties. Just look for the closest closed gas station, auto repair business, or salvage yard. In some places in Arizona, like along Route 66 there is an easy explanation for the large number of brownfields: Interstate 40 bypassed many cities and towns that were formerly vibrant communities and depended on the traffic and commerce that "The Mother Road" provided. The result was that hundreds of gas stations, motels, and restaurants along Route 66 closed. In other places like Phoenix the cause for vacant and abandoned properties in some areas of the city may be as subtle as changing demographics or the historical absence of local control over planning and zoning decisions.



Map Provided Courtesy of the John Hopkins Center for a Livable Future

"Your health is determined more by your zip code than your genetic code."

What you don't see is the toll that this "arrested development" takes on cities and towns across Arizona. When businesses that provide basis services such as groceries or healthy food move out of a neighborhood in need, residents without reliable transportation tend to buy their food from the closest source. This is often a convenience store or gas station filled with chips, hot dogs and soda or a fast food store where the speed of the food sold is inversely proportional to the nutritional value received.

An equally unfortunate situation exists in areas with few or no healthcare facilities. Residents without cars or access to public transportation (called "zero car households" by the U.S. Census) have to make hard choices. Should they spend the limited money they have to travel a long way to pay for expensive medical care, pay their rent, or buy food? Frequently regular visits to the doctor are the first thing that is sacrificed.

There is a name for low income areas where residents live more than a mile from a grocery store. It is called a "food desert". Areas without primary care physicians, hospitals or health clinics are referred to as "medically

underserved areas" or MUAs. When people live in a food desert or an MUA that also have several brownfields properties, reversing the steady decline in their standard of living and quality of life is difficult. The lack of healthy food and healthcare create health "disparities" and the health of lower income populations suffers relative to more affluent neighborhoods and communities. Health statistics show that the occurrence of preventable chronic health problems such as diabetes, hypertension, obesity, and death due to heart disease are all higher in these areas than the rest of Arizona, and almost all of the U.S. A recent study found that the life expectancy of a person living in South Phoenix (with MUAs, food deserts and brownfields) may be as much as 14 years less than a resident living in Scottsdale. Coincidence? Hardly. Health professionals have a saying: "Your health is determined more by your zip code than your genetic code".

What is the solution to the problem? As with many complex socioeconomic and environmental issues, there is no one answer and what works in one area will not necessarily work elsewhere. A cookie cutter approach is neither practical nor effective. However, throughout the U.S. and Arizona, it has been demonstrated that brownfields are often located in the same neighborhoods as, or immediately adjacent to, communities with food deserts and MUAs. Fortunately, this means that a major source of difficult living conditions– vacant, abandoned and contaminated properties also represents a significant opportunity for improving community health and economic development, because of, not despite, their location within long suffering neighborhoods. Studies have shown that investment of public funds in the remediation and redevelopment of brownfields generates a range of public and private benefits, including increased property values, increased tax revenues, jobs retained, new jobs created, environmental benefits, and social benefits.

When it comes to land recycling to increase the number of healthcare facilities, the economic benefits are as significant as the health benefits. It is known that 10 of the 20 fastest growing occupations in the next 10 years will be healthcare related, and healthcare jobs are expected to grow by 14.3% - more than any other industry. Furthermore, there is expected to be 20.5 million jobs in the healthcare industry in during this time. Since 78 million post WWII baby boomers will turn 65 between now and 2029, the aging population will increase healthcare demand since persons over 65 have 3 times as many office visits per year as other populations. Furthermore, healthcare jobs are some of the best paid jobs in today's economy.

Although relatively limited in practice in Arizona it is important to note that land recycling to improve the public health of communities is not a new phenomenon. The redevelopment and reuse of brownfields property to improve community health started 16 years ago when a retired nurse in Florida, Willa Carson, convinced the City of Clearwater and EPA to redevelop an abandoned gas station into a healthcare clinic. Since that time healthcare facilities have been built on distressed properties in New Hampshire, Pennsylvania, Oregon, Minnesota, and California. The redevelopment and reuse of brownfields property for community gardens, urban agriculture and farmers' markets started 25 years ago. Today successful examples of how these properties have been utilized to increase food production and improve access to healthy local food can be found in Connecticut, Massachusetts, Denver, Sacramento, Philadelphia, Chicago, and Portland.

In October 2015, the City of Phoenix secured a three year $400,000 grant from the USEPA to assess the potential to redevelop brownfields for improvement of community health in low-income areas. "Phoenix is excited about the opportunity to have an impact on public health through the Brownfields to Healthfields Project," says Rosanne Albright, Brownfields Program Manager (Phoenix, AZ). "The city has successfully redeveloped Brownfields into a variety of commercial, industrial, and residential uses for a number of years. We're taking our efforts to the next level by focusing on improved access to healthcare and healthy foods through Brownfields development, which positively effects environmental and health equity."

Although the USEPA and the Arizona Department of Environmental Quality have brownfields grant funds available for use by cities, counties and non-profit organizations the use of these funds merely primes the pump. Studies show that for every $1 of public investment in a brownfield property, another $7 to $19 of private investment occur. On site, a dollar of public investment yields $5 to $20 in property value increase. Furthermore, within ¾ mile of a redeveloped brownfield, residential property values increase in the range of 5 to 15 percent. Some studies also show that a new job is created for every $10,000-$13,000 spent on brownfield remediation.

Continued on next page

More information is available at the free Arizona Dept. of Health Services workshop:

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Additional workshops in Tucson and Flagstaff to follow.

Helen DeVos Children's Hospital Worksite
Photo Courtesy of John Eisenschenk, Creative Commons, Wikimedia.com

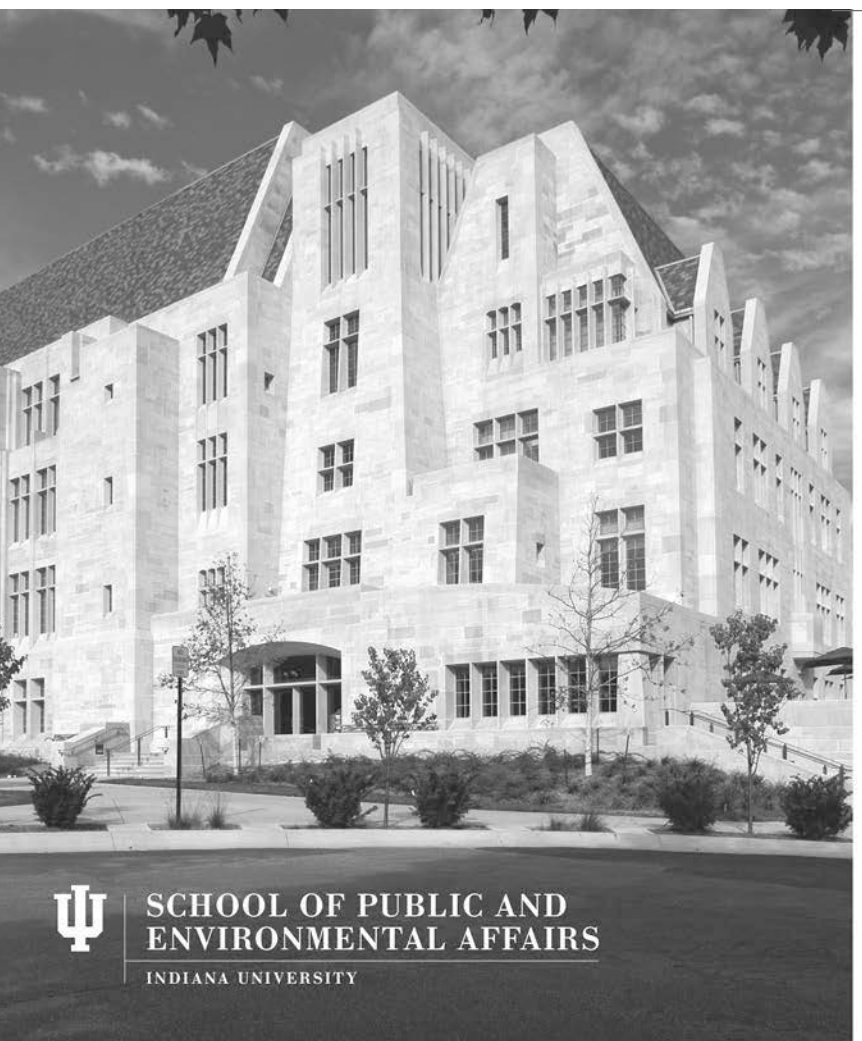
Laney: Creating Community Health & Economic Growth

CONTINUED FROM PREVIOUS PAGE

In addition, 4.5 acres of greenfield land are required to accommodate the same building space that was made available by redeveloping an acre of brownfield. This at the same time that brownfield redevelopment removes or greatly reduces exposure to harmful contaminants in the soil and groundwater. Because of the leveraging of private investment, it is believed that this health and environmental benefit is achieved at a lower cost than if the public sector took responsibility for the entire cost of cleanup, and the benefit is achieved more quickly than if the public sector took no role in supporting cleanup and redevelopment.

The underlying assumption since the establishment the of federal brownfields program in 1995 has been that the public sector will provide enough funding to create a market for brownfield sites and that the private sector will fill in a portion of the funding gap. As a result, the public will not take on the full burden of cleaning up brownfields and will work in partnership with the private sector. To date, this assumption has proven valid. Equally important is that previous experience in brownfields redevelopment has demonstrated that the use of both public and private funds can improve community health and restore economic vitality for "communities in need" where there is little else to reverse long-term decay and stagnation. The value of this work make it a critical part of the long-term sustainability of aging communities and show that it is essential for Arizona to become a national leader in this area.

Dave Laney is a Principal/Senior Project Manager with ATC Group Services with 32 years' experience in property assessment, remediation, and redevelopment projects throughout the southwest. He is the founder of the Arizona Healthfields Initiative, a collaboration of federal, state, and local government, non-profit and for-profit organizations focused on improvement of the health and economic vitality of Arizona communities through sustainable redevelopment of abandoned, underutilized, and contaminated properties and structures. He may be contacted at (480)355-4633 or davelaney@atcassociates.com



From the Editor

The Flint, Michigan water contamination crisis, as you probably are aware, has been a high profile environmental and social issue in the national mainstream media in past weeks and months. Just how serious is this crisis, and how did it come about? In this issue Dr. Larry Olson, in his column "It's All About Chemistry" provides a thorough understanding of the background of the events leading up to the crisis, and, especially valuable to us as environmental and safety professionals, a thorough explanation of the technical aspects and the chemistry involved in the issue. You won't want to miss this article!

Another significant and nationally relevant environmental and social issue, addressing the community health and economic aspects of the thousands of Brownfields in the US, is addressed by Dave Laney in his article, "Land Recycling and Other New Tools for Creating Healthy Communities and Economic Growth".

If you enjoy reading these articles and others in the Journal, please take a minute to thank an advertiser! Thank you!

Sincerely,

Jim Thrush, M.S. Environmental Management
Editor & Publisher 480-422-4430 x42
Email: jimthrush@cox.net

Journal of Environmental Management Arizona

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April / May 2016 Volume 14 Number 2

Articles, Departments, & Columns

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Associations Pages

The Journal of Environmental Management Arizona invites environmental, health and/or safety organizations in Arizona to contribute news articles about their associations. Contact the editor at 480-422-4430 x42.

SAEMS
SOUTHERN ARIZONA ENVIRONMENTAL MANAGEMENT SOCIETY, INC.

WWW.SAEMS.ORG

It has been a very busy couple of months down here in the Old Pueblo. First, we would like to congratulate all of the SAEMS Scholarship Winners. This year SAEMS was able to award $10,200 in scholarship funds to 10 University of Arizona students. Second, we would like to thank our sponsors and all who attended the 2016 SAEMS RCRA Seminar at the Hilton East in Tucson, Arizona. It is your participation that allows this event to be so successful year after year and your generosity that allows us to award scholarships to future EHS professionals.

Our February luncheon featured Chris Hortsman, a PhD Student from the Civil Engineering Department at the University of Arizona, who presented on the Arizona Aqualibrium Project and our March Luncheon featured Mike Block, Water Resources Manager for Metropolitan Domestic Water Improvement District who presented on issues related to CAP Water. In April, our luncheon featured John Adams, Deputy Director of the University of Arizona's Biosphere 2, who presented on the history and future of the Biosphere.

We would lastly like to thank Tucson Clean and Beautiful (TC&B) for the opportunity to participate in the wildcat dump clean-up event they hosted on the east side of Tucson on April 30, 2016. Approximately 40 volunteers from SAEMS and other organizations joined forces that morning and managed to fill three 30-yard roll-off containers in very short order. Being that the site still needs work, SAEMS will be joining TC&B out at the site again in the fall.

Please consider attending SAEMS Luncheons and Events for informative presentations and networking opportunities. Also please note that SAEMS is now offering free memberships to students so they may begin networking with environmental professionals while still pursuing their educational goals. For more information regarding SAEMS and upcoming events please visit our website.

Best Regards !

Derek Koller
President

AIR & WASTE MANAGEMENT ASSOCIATION

WWW.AWMA-GCS.ORG

The Air and Waste Management Association – Grand Canyon Section has had an eventful spring so far! Our April meeting was a lunch meeting, generously sponsored by Geosyntec at The Arrogant Butcher in Downtown Phoenix. Suzanne Kennedy of Geosyntec gave us a review of the Maricopa County Minor NSR rules, as well as a preview of the Minor NSR modeling guidelines to be released later this year.

Our May 20 meeting was a tour held jointly with the Arizona Environmental Strategic Alliance at the ASU MacroTechnology Works in Tempe (8750 S. Science Dr. Tempe, AZ 85284). The MacroTechnology Works is a research and enterprise building for partnerships between the University and private industry (for more info see https://engineering.asu.edu/tour/mtw/).

Our next happy hour will be on May 26, 5-7pm at Casey Moore's Oyster House in Tempe. Even though an RSVP is not required, we request that you please let us know you are coming so we know to look for you. These are typically small events, and it helps if we have a good idea of who is coming.

Our next meeting will be on June 24 at the Maricopa County AQ Dept. Please check our website (www.awma-gcs.org) for more info on this and other upcoming events. Hope to see you soon!

Mike Sonenberg, PE
Chair

ARIZONA ASSE CHAPTER

AZ.ASSE.ORG

Hello all!

The Arizona Chapter's last meeting until the new chapter year starts again in September is June 3rd, with a tour of Sportex Manufacturing. In conjunction with this, we will also have our member recognition for members who have reached the 25 year milestone in the chapter. As my presidential year comes to a close I have been reflecting on how many things were accomplished, how expectations were exceeded, and how amazed I am at the board, the members and the general like-mindedness of the EHS professionals to come together and make this world a better place to work in. Whether you realize it or not, you do make a difference. Keep going, keep pushing, that breakthrough will happen when you least expect it. I am grateful for working with such an amazing group of people, and hope to see you all at the next meeting!

Farewell !

Melissa Schmaltz
President

ARIZONA ENVIRONMENTAL STRATEGIC ALLIANCE

AZALLIANCE.ORG

The Alliance and the Air and Waste Management Association-Grand Canyon Section (A&WMA) held our first joint-member tour on May 20th, at the ASU Macrotechnology Works in Tempe. Our thanks to Steve Ochs and Mike Sonenberg (A&WMA), Kale Walch (Pinal County AQ Dept & Alliance), and Al Brown (Alliance & ASU) and all who participated in the tour arrangements.

The Alliance and the Maricopa County Air Quality Department will co-host the annual one-day Maricopa County Air Quality Permit Compliance Assistance Seminar in Phoenix on July 14th. Attendees will participate in presentations by both county regulators and industry professionals. If your facility has an air quality permit in Maricopa County, or you are a consultant working with a regulated source in Maricopa County, this seminar is for you! For more information, see our full-page advertisement *(page 3)* or visit our website at www.azalliance.org. You can contact me at Gregory.Bopp@Honeywell.com or contact the Alliance at our office at 480-422-7392.

Greg Bopp
Chair

ENVIRONMENTAL PROFESSIONALS OF ARIZONA

WWW.EPAZ.ORG

EPAZ will be co-hosting a networking mixer with ASSE in June. The date and location of the mixer were being determined at the time of this article's publishing, so please check our website for the latest information and details.

Upcoming Events: June 9, 2016 our Luncheon will feature Laura Malone, ADEQ Waste Programs Division Director with an update on Arizona's State Assurance Fund (SAF). **June Mixer with ASSE** – Check our website for details. **July, 2016** – No meeting will be held. **August 11, 2016** our luncheon topic and speaker will be announced soon. Please check our website.

EPAZ hosts monthly luncheon meetings on the second Thursday of the month from 11:30 AM to 1:00 PM at the SRP PERA Club. For the most up to date information, event details and reservations please visit our website at www.epaz.org.

Lisa Culbert
Association Manager

ARIZONA FORWARD

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FATTEST, UNWALKABLE CITY NO MORE: *Country's 'Top Mayor' Transforms "Worst U.S. Walking City" Into Urban Vitality*

Oklahoma City earned the title "Worst U.S. Walking City" seven years ago. The city was later labeled the "No. 2 Fattest City" in America, just behind Miami, Florida. Oklahoma City Mayor Mick Cornett couldn't deny the charges since gaining enough extra pounds while in office to be considered obese. Instead, he launched a campaign to get his city back in shape. Collectively residents lost a million pounds and massive healthy infrastructure improvements followed.

This internationally renowned public servant, who finished second in the City Mayors Foundation's "2010 World Mayor Award," spearheaded an $800-million investment in parks, urban transit, wellness centers and health infrastructure that dramatically improved the quality of life for residents. His MAP3 projects include a 70-acre downtown park, improved sidewalks and hiking/biking trails, a modern streetcar system, a new convention center and senior wellness/aquatic centers.

Cornett shared his story to Arizona business and civic leaders in May at Arizona Forward's Stewardship Summit, a half-day forum focusing on the impact of the built environment on public health and wellness. The unanimous consensus: every community should take a page out of his book.

Diane Brossart
President

Sustainability and Sustainable Development

Nicholas R. Hild, PhD.

The Future of Interconnected-*ness?*

Today, semiconductors are found in mini-computers that control almost everything we do, from our phones, televisions, music, communications systems, electrical power generation systems, and to our automobiles and transportation systems. Think about it: without microprocessors and super-tiny semiconductors in nearly every device we see, hear, touch, and use, our world would all but stand still. Commercial transportation---planes, trains, trucks, and automobiles---have become completely dependent upon both internal and external computerized brain 'systems.' And, auto makers have come to the stark realization that John K. Galbraith had it right, in his seminal 1970 book, "*The Closing Circle*" when he noted the First Law of Ecology was/is, "*Everything is hooked to Everything…"*

The difference, however, in Galbraith's '*ecology*' and what today's auto makers mean is that Galbraith was focused totally on the '*ecological*' chain that "connects" every plant and organism "together" in nature. Automakers, on the other hand, are looking at the necessity of interconnecting every electronic device with every other electronic device that we are dependent on for living our lives in the (new) digital age we have come to be *digitally* dependent on…and, for all future digital devices yet to be invented that will require the same kind of connectivity…and, yes, there's an app for every one!

In the automotive industry, the consortium of more than 40 auto making companies who are goal-centered on addressing this increasingly important digital issue is the Open Automotive Alliance (OAA), originally founded by Audi but whose membership includes tech giants and auto makers--- Google, GM, Ford, Fiat Chrysler, Honda, BMW, Hyundai, Mercedes Benz, Mazda, Porsche, Toyota, Mitsubishi--- and the list goes on. The overarching OAA goal is to place Google's Android '*ecosystem*' in *every* brand of automobile, which began with the 2015 Sonata that is already here. This is a sea change for the idea that, going forward, digital technologies employed in '*everything*' will necessarily need to be able to interconnect wirelessly with almost '*anything*' and '*everyone*' both inside and outside every home and vehicle, via devices we have only imagined to this point in time.

One semiconductor company that already has a lock on wireless charging systems for electric vehicles and connected car-to-car-home-phone communications protocols, is Qualcomm, the company that produces the 4G LTE modems that make in-car Wi-Fi possible in over 90% of all 2014/15/16 cars and pickups built today. Qualcomm Senior VP Nakul Duggal noted at a winter conference aptly billed as the '*Internet of Everything*' that , …"*if you think about it, the (digital) display(s) inside a car, the kind of resolution that we have now…after a point it doesn't matter whether you keep putting in more technology because your eye won't be able to decipher the improvement."* And, automotive audio and infotainment systems are the same way.

So, and this is the point, Duggal says if you leave those alone and just concentrate on bringing new digital technology (into future automotive engine management and drive train applications), digital technology that connects you to your home, office, other mobile devices, from anywhere in the world---it's truly a digital future world we are designing right now---a totally digital world where technology is in control.

The difficulty for car makers, according to Duggal, will be for (all) car makers to accommodate interconnectivity with the endless array of digital technologies that are proliferating exponentially from all directions; technologies that have an impact on what car makers can integrate into their next best automobile, truck, or anything with wheels. Duggal notes that all this spells trouble for auto makers because creating digital technologies is not the car maker's business---but, he says emphatically, "*they are going to have to be in that business if they want to anticipate their customer's wishes*"… for what they want in the next generation of automobiles and trucks.

Consider this: we have all had experience with digital/computer technologies 'crashing' without warning and needing repair or replacing but, at least, we are able to switch to obtain better and newer technology to replace the old. But, what happens when your check engine light comes on and the error message that flashes on your digital screen tells you that your engine management system software will no longer be supported, and will expire in 500 miles or two weeks, whichever comes first?

Or worse, what happens when you are driving across the desert a hundred miles from nowhere and your Android-based Google-supported fuel management system decides the 250 degree temperature under the hood caused the computer to shut down to allow the Wi Fi heat sensor to be reconfigured and you are 75 miles outside Twenty Nine Palms where there is no cell phone service or Nerd Patrol available? Do you think Triple A (AAA) will get your emergency stress call and send the digital cops to your rescue? Do you even know what AAA is? Remember, your Wi Fi is defunct and you can't 'google' for help if you have no connections and the ambient temp outside is 115 degrees---where do you turn for help?

Edward Loh, Chief Editor of Motor Trend (*Editorial*, August 2015) looked at the positive benefits the chase for the next best digital technology would bring to future car buyers, saying in effect, all the digital controls we are seeing in our autos today are a good thing. He notes that, sometime in the 2020's, we will all be driving around---actually, we will just be passengers---in totally autonomous vehicles that literally take over the driving and decision-making, allowing us to just be non-thinking driver *passengers* (not unlike what zombies texting makes drivers now), instead of thinking, decision-making drivers inside our hybrid mobile steel robotic autonomous vehicles. No longer will we be prohibited from texting or talking as we sail down the freeway, worry-free because autonomous technology is totally in control. I, on the other hand being the somewhat pessimistic engineer that I am, see potential problems in a digital future where the technology becomes our controller, ala Orwell's classic, *1984*.

And, even though we've feared the invention of robotics that can actually '*think*' like humans and thereby, become our own worst enemy, ---is it total coincidence that Android is the name of the tech provider here in question, or am I reading too much into what future 'robots' will be able to do?--- the quest for ever more *interconnected-ness* in our "internet of everything" future leaves me wondering: what if we unintentionally allow this sort of insidious integration into our lives, of ever more complex digital technologies that actually ends up controlling our lives? What if the technologies of the future, once integrated across so many platforms literally managing our homes and mobile vehicles, end up being more in control than we are able to manage?

We definitely need to be aware of where this rush to find and utilize more and greater digital technologies might take us, and question the sustainability of it all, lest we end up having to explain how we let it happen to our children's, children's, children.

Nicholas R. Hild, PhD., is an Emeritus Professor and Sustainability Scientist in the College of Technology and Innovation and the founder of the Environmental Technology Management program at Arizona State University. Dr. Hild has extensive industrial environmental engineering and management experience as well as continuing to be a consulting environmental engineer for the past 40+ years. Reach him at www.worldsleadingexpert.com or email at drnick@asu.edu.

News Briefs

ADEQ Ombudsman and Tribal Liaison Ian Bingham Expands Role

✣ Arizona Department of Environmental Quality (ADEQ) officials announced recently the appointment of Ian Bingham, ADEQ Ombudsman and Tribal Liaison since 2010, to ADEQ Communications Director. This appointment expands Mr. Bingham's current service, as he is continuing his role as Ombudsman and Tribal Liaison. In his new capacity, Mr. Bingham will counsel agency executive leadership and direct and manage strategic, proactive marketing and branding activities, internal and external communication and outreach.

Of additional benefit to ADEQ and Governor Douglas A. Ducey's governmental transformation initiative, Mr. Bingham has designed and implemented processes that remove process waste, increase efficiency and dramatically improve performance since the mid-1990s.

"Widely admired and respected inside and outside of the agency, Mr. Bingham exhibits a true passion for and deep understanding of the value effective communication brings to furthering the Arizona Department of Environmental Quality mission of protecting and enhancing public health and the environment," said Director Cabrera. "Mr. Bingham leads by example – his commitment to the environment and our community go far beyond his work at the Arizona Department of Environmental Quality in his service as a member of the Board of Directors for the Stewardship Action Council, Arizona Environmental Strategic Alliance Advisor, and mentoring youth by coaching basketball since 1989," Director Cabrera added.

Now in his 25th year of agency service, his prior experience includes management positions in the Underground Storage Tank (UST) Inspections and Compliance and Corrective Action programs, Waste Programs Division Enforcement Coordinator, technical advisor for UST, Arizona Environmental Performance Track Program Administrator, and most recently, Voluntary Environmental Stewardship Program Coordinator, and Arizona Power Plant and Transmission Line Siting Committee Representative.

EPA Recognizes University of Arizona for Efforts to Reduce Wasted Food

✣ The U.S. Environmental Protection Agency recently presented the University of Arizona with an award for outstanding efforts in food recovery. The students, food service staff and university leaders, along with the Tohono O'odham Nation's San Xavier Co-operative Farm and the City of Tucson worked together to increase food recovery by 1,232% from 2013 to 2014. Last year, the partnership diverted 3.4 million pounds of food waste, landscape debris, and manure from the landfill.

"This innovative zero waste partnership is a result of student, university, tribal and city leaders working together to expand composting," said Jared Blumenfeld, EPA's Regional Administrator for the Pacific Southwest. "We're pleased to see the University of Arizona taking a national leadership role in reducing food waste."

"We are proud to take part in the EPA Food Recovery Challenge. We are also proud to have the EPA recognize that food waste is an especially serious problem in Southern Arizona due to the 2 million tons of produce entering the U.S. through the port at Nogales each year. We could never have been successful without the City of Tucson and the San Xavier Co-op Farm, and other partners in this community," said Chet Phillips, sustainability coordinator for the Associated Students of the University of Arizona and Compost Cats co-founder and program coordinator.

"We're honored that the EPA is taking the time to visit Compost Cats. These students have shown the leadership potential of UA students, and it's so exciting to be able to share this with a wider regional and national audience," said Ben Champion, director of the UA's Office of Sustainability.

The ASUA Compost Cats started with a student proposal to do something better with food scraps from the student union than send them to the landfill. In only five years, a simple student idea grew into a tri-institutional partnership program that takes in material from across Tucson, southern Arizona, and beyond. The food scraps are transformed into a valuable soil amendment that enriches local food-growing soils to help conserve water and grow more food. Over the past five years, approximately 10.4 million pounds of material have been composted.

Across the nation, almost 35 million tons of food go into our landfills annually, at a cost of more than $161 billion. Each year, the average family of four throws away about $1,600 worth of uneaten food. Food waste is the largest single material in landfills, accounting for 21% of the American waste stream. As food rots in a landfill, it produces methane, a greenhouse gas contributing to climate change that's 25 times as potent as carbon dioxide.

At the same time, one in six Americans lacks access to the nutrition they need to live an active, healthy life. While inedible food scraps are best managed by composting or anaerobic digestion, excess or leftover edible food should feed people. Surplus food can be donated to local food banks, shelters, and soup kitchens.

In 2014, nearly 800 governments, businesses and organizations participated in EPA's Food Recovery Challenge, including educational institutions, grocers, sports and entertainment venues and restaurants. These entities diverted wasted food from entering landfills or incinerators through a variety of innovative actions, including creative re-use of trimmings by university dining staff; donating excess, wholesome food; composting in urban settings; and using wasted food to produce electricity.

Through innovation and hard work, Food Recovery Challenge participants and endorsers have diverted over 606,000 tons of wasted food, including over 88,500 tons donated to feed people, from landfills.

Larry Olson, PhD.

It's All About Chemistry

How a Lack of Understanding Chemistry Doomed Flint, Michigan

Rarely has there been a case study as dramatic as the water crisis in Flint, Michigan, which demonstrates how ignorance of basic science can lead to human health and financial disaster. In this column we won't focus on who was responsible, that's an on-going debate, but rather what happened. What was the chemistry behind the dramatic increase in lead in Flint's water supply?

The city of Flint was once a thriving manufacturing center for GM's Chevrolet and Buick cars. But with the closure of those plants, its population dropped precipitously and it is now one of the poorest areas of Michigan. The financial crisis in Flint prompted the Governor to appoint an emergency manager to take over management of the city from local officials. As a cost savings measure, a decision was made in 2013 to switch Flint's water supply from Detroit's system, which used water from Lake Huron, to the Karegnondi Water Authority, which was building its own pipeline from the lake. But this system was not going to be ready for a year and Flint was notified that its long term agreement with Detroit would be terminated as a result of its decision. There is controversy over what type of interim proposition Detroit made to Flint, but it was rejected in favor of having the city itself treat water from the Flint River until the new pipeline was finished.

So in April of 2014, the city of Flint switched to using Flint River water and problems surfaced almost immediately. These included foul tasting reddish water coming from taps, boiling water advisories about *Escherichia coli*, violations of Maximum Contaminant Levels for trihalomethanes, and in October a decision by a remaining General Motors plant to stop using the water because it was corroding steel parts.

All of this was bad enough, but early in 2015 evidence that Flint water contained high levels of lead began to emerge. Flint resident Lee Ann Walters was worried that something in the water was causing her family to break out in rashes, lose their hair, and in the case of one of her twin sons, to lose weight compared to his brother. Following her complaint to U.S. EPA, the Flint Water Department tested the water in her home and the first two results were 104 and 397 µg/L. EPA's action level for lead is 15 µg/L. Scared, she had her children tested and the one twin was found to have lead poisoning. Subsequent testing has shown as much as 10% of Flint children in areas with highest lead concentrations in water have elevated blood lead levels.

By this time, residents had little trust for anyone in government. Lee Ann Walters turned to Dr. Marc Edwards of Virginia Tech, who a decade earlier had made a name for himself by proving that corrosion in water pipes had allowed lead to enter the water supply of Washington D.C. By September 2015, the Virginia Tech group had tested over 250 homes and issued a preliminary report that showed 40% of homes in Flint had elevated lead levels and recommending the State declare Flint water not suitable for drinking or cooking. Under pressure, in October 2015, Flint switched back to Detroit water as its source.

Why did all this happen? What was it about Flint River water that caused such dramatic changes? First, like many older cities, there are miles of lead pipes in Flint's water system, mostly as service lines connecting water mains to a home's water meter. Like all metal pipes, these are subject to corrosion which starts as an oxidation of the metal. Corrosion of water pipes (iron, lead or copper) is extremely complex and dependent upon variables such as pH, alkalinity, dissolved oxygen, and chloride content. The oxidized metal can be soluble or can form a mineral crust coating the inside surface creating a passivation layer that protects the pipe from further corrosion by limiting the diffusion of oxygen to the surface. But these scale particles are heterogeneous and can be detached from the surface by water velocity, physical disturbance (like nearby construction), or a change in water chemistry. It is likely that some of the very high levels of lead detected by the Virginia Tech group (one sample was 13,200 µg/L) was due to dislodging of lead scale particles built up over many years.

One of the ways in which corrosion can be mitigated is by adding a phosphate corrosion inhibitor to the water, which the Detroit water system was doing. But Flint decided not to do that when they switched sources and took over control of water treatment themselves. To demonstrate the impact of this change in water treatment, the Virginia Tech group did a simple experiment in which copper pipe was joined with lead solder and then placed in either treated water from the Flint River or the Detroit system. After 5 weeks, there was 16 times as much lead in water from the Flint River as from Detroit. One estimate was that adding phosphate corrosion inhibitors would have cost the city about $140 per day. Replacing all of Flint's lead service lines is estimated to cost $1.5 billion according to the mayor.

Another important factor is pH which typically is carefully controlled by the water utility. Flint River water had a pH of about 8.0 in December of 2014 but it dropped to 7.3 by August of 2015. Lower pH, in the absence of inhibitors, can accelerate metal oxidation. By comparison, Boston, another city with extensive lead pipes, held the average pH in its water to around 9.6 in 2015.

A final difference in the two water supplies was chloride concentration. The Detroit system water averaged 11.4 ppm in 2014 while the treated Flint River water was 85 ppm in August 2015. This may have been due to the efforts to address high *E. coli* levels in the summer of 2014, right after the switch, by increasing chlorine disinfection. But a by-product of chlorine and high organic levels in water is trihalomethanes. To reduce the amount of organic matter, the Flint plant added ferric chloride, which helps coagulate organic matter and make it easier to filter out. But the result was to increase chloride concentrations. Studies have shown increased lead corrosion when the chloride to sulfate concentration exceeds 0.58. Detroit system water was 0.45 while Flint River water was 1.6.

The lessons from Flint cover political, economic, environmental justice, and scientific issues. They will be studied for years. But the real victims are the children in Flint, who were exposed to possible life changing events through no fault of their own and for no good reason. We have to do better than this.

Larry Olson, PhD., Associate Professor, Arizona State University Environmental Technology Management Program. Dr. Olson holds a Ph.D. in Chemistry from the University of Pennsylvania, and is an environmental chemist with interests in remediation technologies and international environmental management. He can be reached at 480-727-1499, or by email at Larry.Olson@asu.edu

ADOT Equipment Services Environmental Green Shop Award Program

Reduces Environmental Impact Encourages & Recognizes Environmental Achievement

Information and text for this article provided in part by Robert Trapani and ADOT Equipment Services

Environmental Green Shop Program

The Arizona Department of Transportation (ADOT) Equipment Services' Green Shop program began in 2006 with the development of a best-practices manual offering guidelines on subjects including keeping shops clean and organized for efficient operations and properly containing spills. It has become an important part of daily operations at all ADOT service shops.

More than 40 government agencies contract with ADOT Equipment Services, including the Arizona Game and Fish Department, Arizona Department of Public Safety, police departments and school districts. The shops perform preventive maintenance and major repairs on light trucks, snowplows, watercraft, snowmobiles, school buses and more.

Environmental Green Shop Awards

In 2008, ADOT Equipment Services implemented the Environmental Green Shop Award Program. The program supports equipment repair shops in exceeding national environmental compliance standards and encourages each shop to move beyond compliance in its own way.

ADOT's goal for the program is to promote 'green' operational practices, reduce waste, and improve sustainability. The program evaluates the impact of a shop's operations on the environment with measureable results and provides an opportunity to apply environmental best management practices reducing cost, carbon footprint, and energy consumption of our infrastructure state-wide. As a result of this program, the repair shops have realized savings on chemical purchases; disposal costs, regulatory monitoring, reporting and permit fees; water, electricity and sewer use charges. The Green Shop Award Program is an important way ADOT can recognize its own people and reward the 'Top Shop' for their commitment and for being great stewards of the environment. Every two years, one full-service shop and one satellite location are honored following three inspections, one of which is unannounced, to see how operations are following the Green Shop guidelines.

2016 Green Shop Awards

In April 2016, ADOT Equipment Services held a ceremony to present the Green Shop Award for the "Main Shop" winner to the Tucson Equipment Shop Green Team. *(See photo on opposite page: Tucson Equipment Shop Green Team)*. A second ceremony, for the "Satellite Shop" winner Green Team *(not shown)* was held in May 2016 in Springerville, to honor the Springerville Equipment Shop.

The Tucson facility, where the Arizona Department of Transportation repairs and maintains its vehicles,

has significantly reduced the amount of trash it generates by recycling scrap metal, batteries, automotive fluids, paper and more. In addition, converting to LED lighting has reduced energy use.

The Green Shop Awards for both ADOT's repair facility in Springerville, and the Tucson operation recognize the facilities achievements to minimize environmental impact, cut waste, and increase recycling at 22 ADOT Equipment Services locations. "We're reducing the cost to the state because we're keeping waste down," said Nathan Carroll, the fuel, scales, environmental and training manager for ADOT Equipment Services. "The end result is increasing productivity. For the taxpayer, that's a good thing."

Tucson Equipment Shop is Presented the 2016 Green Shop Award, Main Shop

For more information about the ADOT Green Shop Program:

Contact Mr. Robert V. Trapani, CET, CIT, WSO-CSS/CHME, Environmental Engineering Specialist. Phone (602) 712-6177 or Email: rtrapani@azdot.gov or contact the Arizona Department of Transportation, 2225 S. 22nd Ave., Phoenix, Arizona, 85009.

The 2016 Gatekeeper Regulatory Roundup: IN PHOTOS

The Environmental Professionals of Arizona (EPAZ) hosted the 12th Annual Gatekeeper Regulatory Roundup March 29th & 30th in Tempe, Arizona at the DoubleTree by Hilton.

The event included presentations by regulators and industry professionals on a wide range of environmental, health & safety topics. Keynote speakers included Damon Carson, President and Founder of repurposedMATERIALS, with "Avoid the Landfill & Generate Profits"; and CDR Lisa Delaney, MS, CIH, Assoc. Director for CDC's Emergency Preparedness and Response, on "Preparing for & Executing NIOSH's Response to Domestic Public Health Emergencies". Tuesday's program highlights included a Water Quality Panel, and ADEQ Updates from the new Deputgy Director Bret Parke and ADEQ Division Directors. Wednesday's program highlights included a Semiconductor Industry Focus panel discussion.

Attendees also had the opportunity to network with other Arizona EH&S professionals, and to visit suppliers & consultants at Sponsor Booths.

For more information on the Gatekeeper Regulatory Roundup or to learn more about EPAZ, visit their website at www.epaz.org.

2016 GRR PLANNING COMMITTEE

2016 June 9

Environmental Response, Inc.

Luncheon Featuring: Speaker: Laura Malone, ADEQ Waste Programs Division Director
Topic: "Update on Arizona's State Assurance Fund (SAF)".
Sponsor: Environmental Response, Inc.

2016 June Mixer (Date TBD)

June Mixer With ASSE: Check our website for details.

2016 July (No Meeting)

2016 August 11

Luncheon: Topic and Speaker to be announced soon.
Check our website for details.

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visit our new website at:

www.epaz.org

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