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Don't forget to mark your calendars for upcoming environmental events -- EPAZ is hosting it's annual Gatekeeper Regulatory Roundup on March 16 & 17, 2017, and the Arizona Environmental Strategic Alliance is co-hosting its annual Air Quality Permit Compliance Assistance Seminar with Pinal County Air Quality Control Department on February 1, 2017. See pages 3 and 4 for more information.

As always, thank you to our advertisers, authors, contributors, and our readers! Have a very Merry Christmas & Happy 2017 New Years! Sincerely,

Jim Thrush, M.S. Environmental Management
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JOURNAL OF ENVIRONMENTAL MANAGEMENT ARIZONA

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JOURNAL OF Environmental Management ARIZONA

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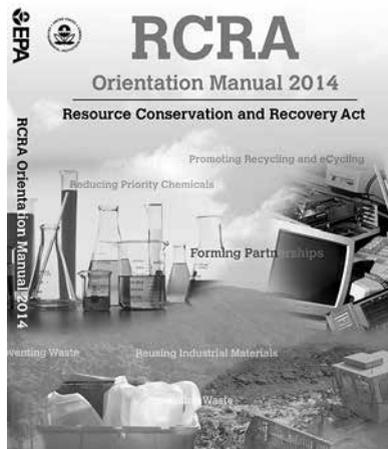
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THE EPA RCRA ORIENTATION MANUAL

Whether you are new to the Resource

Conservation and Recovery Act (RCRA) or if you have been in the environmental management field for years, you will likely find EPA's RCRA Orientation Manual to be a useful guide and resource. The manual, recently updated in 2014, is an extensive volume (242 pages) compiling "everything you always wanted

to know about hazardous waste" into a readable and comprehensive source. This article is an excerpt from Chapter One, "An Introduction to the Resource Conservation and Recovery Act (RCRA)". (To download a copy of the full manual as a PDF, see the EPA website information at the end of this article.)



INTRODUCTION TO THE RESOURCE CONSERVATION AND RECOVERY ACT

OVERVIEW

The Resource Conservation and Recovery Act (RCRA), an amendment to the Solid Waste Disposal Act, was enacted in 1976 to address the huge volumes of municipal and industrial solid waste generated nationwide.

The goals set by RCRA are:

- To protect human health and the environment from the potential hazards of waste disposal
- To conserve energy and natural resources
- To reduce the amount of waste generated
- To ensure that wastes are managed in an environmentally sound manner.

RCRA also regulates **underground storage tanks (USTs)** that store petroleum or certain chemical products under Subtitle I. Requirements exist for the design and operation of these tanks and the development of systems to prevent accidental spills. Examples of facilities using these tanks include petroleum refineries, chemical plants, and commercial gas stations.

The Medical Waste Tracking Act of 1988 was a 2-year demonstration program that expired in June 1991. It created a Subtitle J program designed to track **medical waste** from generation to disposal. At present, no federal EPA tracking regulations are in effect for medical waste, but many states have adopted their own programs.

The Comprehensive Environmental Response, Compensation, and Liability Act (known as Superfund or CERCLA) is a related statute that deals with cleaning up inactive and abandoned hazardous waste sites. RCRA, on the other hand, deals with materials that are currently destined for disposal or recycling.

RCRA: WHAT IT IS

The term RCRA is often used interchangeably to refer to the law, regulations, and EPA policy and guidance. The law describes the waste management program mandated by Congress that gave EPA authority to develop the RCRA program. EPA regulations carry out the Congressional intent by

providing explicit, legally enforceable requirements for waste management. These regulations can be found in Title 40 of the Code of Federal Regulations (CFR), Parts 239 through 282. EPA guidance documents and policy directives clarify issues related to the implementation of the regulations. These three elements are the primary parts of the RCRA program.

THE ACT

The Act provides, in broad terms, general guidelines for the waste management program envisioned by Congress (e.g., EPA is directed to develop and promulgate criteria for identifying hazardous waste). The Act also provides the EPA Administrator (or his or her representative) with the necessary authority to develop these broad standards into specific requirements that implement the law.

What we commonly know as RCRA, or the Act, is actually a combination of the first federal solid waste statutes and all subsequent amendments (see Figure I-1). In 1965, Congress enacted the Solid Waste Disposal Act, the first statute that specifically focused on improving solid waste disposal methods. The Solid Waste Disposal Act established economic incentives for states to develop planning, training, research, and demonstration projects for the management of solid waste. The Act was amended in 1976 by RCRA, which substantially remodeled the nation's solid waste management system and laid out the basic framework of the current hazardous waste management program.

The Act, which has been amended several times since 1976, continues to evolve as Congress alters it to reflect changing waste management needs. The Act was amended significantly on November 8, 1984, by the Hazardous and Solid Waste Amendments (HSWA), which expanded the scope and requirements of RCRA. HSWA was created largely in response to citizen concerns that existing methods of hazardous waste disposal, particularly land disposal, were not safe. Because of their significance and differences in their implementation, HSWA provisions are emphasized throughout this manual. Congress also revised RCRA in 1992 by passing the Federal Facilities Compliance Act, which strengthened the authority to enforce RCRA at federal facilities. In addition, the Land Disposal Program Flexibility Act of 1996 amended RCRA to provide regulatory flexibility for the land disposal of certain wastes.

Today, the Act consists of 10 subtitles (see Figure I-2). Subtitles A, B, E, F, G, H, I, and J outline general provisions; authorities of the EPA Administrator; duties of the Secretary of Commerce; federal responsibilities; miscellaneous provisions; research, development, demonstration, and information requirements; underground storage tanks; and medical waste tracking. Other subtitles lay out the framework for the two major programs that comprise RCRA: Subtitle C (the hazardous waste management program) and Subtitle D (the solid waste program).

The text of the Act can be found at www.epa.gov/lawsregs/laws.

REGULATIONS

The Act includes a Congressional mandate directing EPA to develop a comprehensive set of regulations. **Regulations**, or **rulemakings**, are issued by an agency, such as EPA, that translate the general mandate of a statute into a set of requirements for the Agency and the regulated community.

Regulations are developed by EPA in an open and public manner according to an established process. When a regulation is formally proposed, it is published in an official government document called the *Federal Register* to notify the public of EPA's intent to create new regulations or modify existing ones. EPA provides the public, which includes the potentially regulated community, with an opportunity to submit comments. Following an established comment period, EPA may revise the proposed rule based on both an internal review process and public comments.

The final regulation is published, or promulgated, in the *Federal Register*. Included with the regulation is discussion of the Agency's rationale for the regulatory approach, known as preamble language. Final regulations are compiled annually and incorporated in the Code of Federal Regulations (CFR) according to a highly structured format based on the topic of the regulation. This latter process is called **codification**, and each CFR title corresponds to a different regulatory authority. For example, EPA's regulations are in Title 40 of the CFR. The codified RCRA regulations can be found in Title 40 of the CFR, Parts 239-282. These regulations are often cited as 40 CFR, with the part listed afterward (e.g., 40 CFR Part 264), or the part and section (e.g., 40 CFR §264.10).

Although this relationship between an Act and the regulations is

the norm, the relationship between HSWA and its regulations differs slightly. Congress, through HSWA, not only provided EPA with a general mandate to promulgate regulations, but also placed explicit instructions in the Statute to develop certain regulations. Many of these requirements are so specific that EPA incorporated them directly into the regulations. HSWA is all the more significant because of the ambitious schedules that Congress established for implementation of the Act's provisions. Another unique aspect of HSWA is that it established **hammer provisions**, or statutory requirements that would go into effect automatically (with the force of regulations) if EPA failed to issue regulations by certain dates.

The interpretation of statutory language does not end with the codification of regulations. EPA further clarifies the requirements of the Act and its regulations through guidance documents and policy.

The RCRA regulations can be found at www.epa.gov/epawaste/laws-regs.

GUIDANCE AND POLICY

Guidance documents are issued by EPA primarily to provide direction for implementing and complying with regulations. They are essentially "how to" documents. For example, the regulations in 40 CFR Part 270 detail what is required in a permit application for a hazardous waste management facility, while the guidance for this Part suggests how to evaluate a permit application to ensure that all information has been included. Guidance documents also elaborate on the Agency's interpretation of the requirements of the Act.

Policy statements, on the other hand, specify operating procedures that should generally be followed. They are mechanisms used by EPA program offices to outline the manner in which the RCRA programs are implemented. For example, EPA's Office of Resource Conservation and Recovery (ORCR) may issue a policy outlining what actions should generally be taken to achieve RCRA corrective action cleanup goals. In many cases, policy statements are addressed to the staff working on implementation, but they may also be addressed to the regulated community.

RCRA: HOW IT WORKS

To provide an overall perspective of how RCRA works, each waste program is briefly summarized here. Later, the Subtitle D (solid waste) program is discussed before the Subtitle C (hazardous waste) program. Although this is alphabetically out of order, the structure is designed for better understanding by the reader.

SUBTITLE D—SOLID WASTE

RCRA Subtitle D focuses on state and local governments as the primary planning, regulating, and implementing entities for the management of nonhazardous solid waste, such as household garbage and nonhazardous industrial solid waste. EPA provides these state and local agencies with information, guidance, policy, and regulations through workshops and publications to help states and the regulated community make better decisions in dealing with waste issues, to reap the environmental and economic benefits of source reduction and recycling of solid wastes, and to require upgrading or closure of all environmentally unsound disposal units. In order to promote the use of safer units for solid waste disposal, EPA developed federal criteria for the proper design and operation of **municipal solid waste landfills** (MSWLFs) and other solid waste disposal facilities. Many states have adopted these criteria into their state solid waste programs.

SUBTITLE C—HAZARDOUS WASTE

RCRA Subtitle C establishes a federal program to manage hazardous wastes from **cradle to grave**. The objective of the Subtitle C program is to ensure that hazardous waste is handled in a manner that protects human health and the environment. To this end, there are Subtitle C regulations for the generation, transportation, and treatment, storage, or disposal of hazardous wastes. In practical terms, this means regulating a large number of hazardous waste handlers. As of 2009, EPA had on record approximately 460 treatment, storage, and disposal facilities (TSDFs); 18,000 transporters; and 14,700 large quantity generators (LQGs).

The Subtitle C program has resulted in perhaps the most comprehensive regulations EPA has ever developed. The regulations first identify the criteria to determine which solid wastes are hazardous, and then establish various requirements for the three categories of hazardous waste handlers: generators, transporters, and TSDFs. In addition, the Subtitle C regulations set technical standards for the design and safe operation of TSDFs. These standards

are designed to minimize the release of hazardous waste into the environment. Furthermore, the regulations for TSDFs serve as the basis for developing and issuing the permits required by the Act for each facility. Permits are essential to making the Subtitle C regulatory program work, since it is through the permitting process that EPA or a state applies the technical standards to TSDFs.

One of the primary differences between Subtitle C and Subtitle D is the type of waste each regulates. Subtitle C regulates only hazardous waste, a subset of solid waste, whereas Subtitle D primarily regulates nonhazardous solid waste.

WHO IS INVOLVED IN RCRA?

The RCRA program involves many people and organizations, all with varying roles. Congress and the President set overall national direction for the RCRA program through amendments to the Act. EPA, through its Office of Solid Waste and Emergency Response (OSWER), translates this direction into operating programs by developing regulations, guidance, and policy.

Site-specific implementation of the RCRA program is the responsibility of the EPA regions and states. Hazardous and solid waste programs have mechanisms through which states can exercise key program responsibilities. Initial federal responsibilities vary among the different programs.

Under Subtitle D, EPA established minimum criteria for MSWLFs and required each state to gain approval for their MSWLF permitting program through an approval process that ensures that the state's program meets minimum federal criteria. Most of the Subtitle D solid waste program is overseen by the states, and compliance is assured through state-issued permits.

State involvement in the Subtitle C program is similar to involvement in the Subtitle D program. Under Subtitle C, in the authorization process, EPA reviews a state's hazardous waste program and, if it is at least as stringent as the federal program, grants the state authority to implement its own program in lieu of the federal program. These states are known as authorized states.

The **regulated community** that must understand and comply with RCRA and its regulations is a large, diverse group. It includes not only facilities typically thought of as hazardous waste generators, such as industrial manufacturers, but also government agencies and small businesses, such as a local dry cleaner generating small amounts of hazardous solvents, or a gas station with underground petroleum tanks.

Lastly, the general public plays a key role in RCRA by providing input and comments during almost every stage of the program's development and implementation, through rulemaking participation and comments on TSDF permits.

RCRA TODAY

Ensuring responsible waste management practices is a far-reaching and challenging undertaking that engages EPA Headquarters and regions, state agencies, tribes, and local governments, as well as everyone who generates waste. EPA has largely focused on building the hazardous and municipal solid waste programs and fostering a strong societal commitment to recycling and pollution prevention. Since the enactment of RCRA, EPA has built a comprehensive cradle-to-grave regulatory program for hazardous waste management; authorized forty-eight states to implement RCRA; set national baseline standards for municipal solid waste landfills; identified priority pollutants on which to focus hazardous waste reduction efforts; worked in successful partnerships to reduce waste, promote recycling, and build markets for recycled-content products; and provided education and technical assistance.

Continued on next page

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RCRA ORIENTATION MANUAL

CONTINUED FROM PREVIOUS PAGE

LOOKING TO THE FUTURE

In the future, EPA will maintain and build on the effective hazardous and municipal waste programs already in place. At the same time, EPA must increase efforts in resource conservation, sustainability, and safe materials management. Safe waste management and cleanup remain the critical foundation to protect human health and the environment. EPA now relies on a largely complete regulatory structure for hazardous and municipal waste and proven implementation programs to ensure safe management. EPA will assess potential threats from wastes and address critical program improvements in the most effective manner, either through regulatory changes, cooperative voluntary efforts, or other means.

Striving for sustainability and materials management are long-term challenges. EPA will look beyond the traditional definition of waste to determine how programs fit into, and can benefit from, a life cycle approach to ensure that chemicals and materials are managed protectively, in all stages of use and discard. In addition, waste issues must be considered beyond the nation's boundaries to maximize environmental results and achieve sustainability and safe materials management. A top priority is to reduce the generation of industrial and municipal waste and to conserve resources while reducing environmental impacts. Through the Resource Conservation Challenge (RCC), EPA is undertaking a broad spectrum of efforts to encourage waste minimization, pollution prevention, energy recovery, and recycling. Where necessary, this may require refining the current regulatory system. However, the scope of EPA's regulatory work is narrower and relies more on improving compliance with the existing regulations. There are only two remaining rulemakings to complete the hazardous waste regulatory structure and 1984 statutory mandates. Other regulatory activities are primarily targeted to simplify and add flexibility and facilitate resource conservation and pollution prevention.

EPA believes a key to success for RCRA and for improving the corrective action program will be building new partnerships and coalitions with government agencies, businesses, interest groups, and the public. While EPA has made great strides in working in true partnership with the states, more remains to be done. The goal of faster, more efficient cleanups will continue, and new corrective action goals will focus on the activities that precede completion of final corrective action, remedy selection, and construction. Encouraging facilities to achieve corrective action goals helps move the program toward success and provides increased protection against exposure to contaminants that have been released from corrective action facilities.

CONSERVING NATURAL RESOURCES

EPA will continue to help society reduce the amount and toxicity of wastes that facilities generate and promote safe recycling and energy recovery. A successful materials management approach will assess risks and ensure that harmful chemicals do not enter the environment throughout the life cycle of material handling. Resources that simply become waste are not available for future generations, and extraction and harvesting of resources can have long-term environmental impacts. Despite protective waste management programs, toxic chemicals can still find their way into the environment throughout the life cycle of materials. Persistent, bioaccumulative, and toxic chemicals released into the environment can present long-term risks to human health and the environment, even in small quantities. The challenge is to mobilize industries, state and local agencies, communities, and the public through collaborative efforts and by harnessing regulatory incentives to minimize threats to human health and the environment. The RCC will be the main vehicle by which EPA works to meet this challenge. The main objectives for conserving natural resources are reducing priority chemicals, stimulating product stewardship and recycling, fostering the transition to materials management, forming partnerships, promoting recycling and safe energy recovery from waste, and engaging consumers and under-served communities.

PREVENTING FUTURE WASTE PROBLEMS

EPA will sustain and enhance effective state programs for hazardous, municipal, and industrial waste management and EPA regional implementation to ensure protective management tailored to the full spectrum of wastes that facilities generate. The large universe of waste generators and treatment, storage, and disposal facilities (TSDFs) subject to hazardous and solid waste requirements presents a substantial challenge. EPA intends to identify unaddressed significant risks from current and new wastes and waste management practices and incorporate flexibility, and ensure that all wastes are managed protectively without unnecessary costs. The main objectives for preventing future waste problems are

setting national goals for hazardous waste management facilities, supporting state implementation of hazardous and solid waste programs, building tribal capacity, maintaining and updating the federal regulatory programs, assisting industries to comply and move beyond compliance, engaging stakeholders, and improving waste and materials management.

CLEANING UP PROBLEMS FROM PAST PRACTICES

EPA will continue to facilitate protective, practical completion of cleanups at hazardous waste TSDFs and help develop and/or strengthen state and tribal waste cleanup programs. These cleanups present a challenge because several thousand RCRA facilities have potentially released hazardous waste to the environment. In addition, cleanup may be costly and can take considerable time. EPA hopes to achieve timely cleanups at high priority facilities and create an environment in which all stakeholders can work together using a variety of tools and cleanup programs. The main objectives for cleaning up problems from past practices are controlling human exposures and ground-water releases, promoting mechanisms for flexible cleanups, supporting a "one cleanup program" framework, promoting revitalization and reuse, and supporting the tribal open dump cleanup and prevention program.

OUTLINE OF THE MANUAL

The remainder of this manual details the three RCRA programs briefly discussed in this introduction. The manual also describes two other components of RCRA: the federal procurement and medical waste tracking programs. In addition, the manual discusses the interrelationships between RCRA's Subtitle C program and other environmental statutes, as well as RCRA's public participation provisions. To supplement this technical description of the RCRA regulatory program, the manual also contains appendices that present important RCRA forms and paperwork requirements and a glossary (for the reader's convenience, the terms that appear in this glossary have been bolded throughout the text).

SUMMARY

RCRA was passed in 1976, as an amendment to the Solid Waste Disposal Act of 1965, to ensure that solid wastes are managed in an environmentally sound manner. The goals of RCRA have changed over time as EPA has implemented the program. The current goals are:

- To protect human health and the environment from the potential hazards of waste disposal
- To conserve energy and natural resources
- To reduce the amount of waste generated
- To ensure that wastes are managed in an environmentally sound manner
- Prevent future problems caused by irresponsible waste management
- Clean up releases of hazardous waste in a timely, flexible, and protective manner.

To achieve these goals, EPA will rely heavily on three programs:

- The current regulatory framework already in place
- Collaborative partnerships with stakeholders, such as those developed under the Resource Conservation Challenge
- The RCRA corrective action program.

There are several components of RCRA:

Act – The law that describes the kind of waste management program that Congress wants to establish. The Act also provides the Administrator of EPA (or his or her designee) with the authority to implement the Act.

Regulations – The legal mechanism that establishes standards or imposes requirements as mandated by the Act. RCRA regulations are promulgated by EPA, published in the *Federal Register*, and codified in the CFR.

Guidance – Documents developed and issued by EPA to provide instructions on how to implement requirements of either the Act or regulations.

Policy – Statements developed by EPA outlining a position on a topic or giving instructions on how a procedure should be conducted.

RCRA continues to change with amendments to the Statute. HSWA, in particular, significantly expanded both the scope and detailed requirements of the Act, especially in the context of the land disposal of hazardous wastes. Congress, EPA, states, regulated entities, and the general public are involved in developing and implementing the RCRA program. EPA continues to improve the RCRA program by using measurable results to identify and promote new initiatives, such as encouraging waste minimization, improving the federal/state partnership in the hazardous waste program, and aiding state and local governments in reaping the environmental and economic benefits of source reduction and recycling.

SOURCE: US EPA at epa.gov. The full volume of this RCRA Orientation Manual is available for download as a PDF at: <https://www.epa.gov/hwgenerators/resource-conservation-and-recovery-act-rcra-orientation-manual>.



SUSTAINABILITY AND SUSTAINABLE DEVELOPMENT

Nicholas R. Hild, PhD.

MEASURING PROGRESS IN ENVIRONMENTAL SUSTAINABILITY

PART II OF II

“It ain’t easy being green!”

Kermit the Frog, Sesame Street

In Part I in the last Journal issue, we learned that companies wanting to fill EH&S positions are interested in learning about an applicant’s knowledge about ways to measure environmental sustainability. Since the use of the term, ‘sustainability’ has proliferated and is being applied to every kind of endeavor imaginable, it is important that a company knows how to focus their sustainability efforts on reducing the impact of their operations on the environment. They need to know that a EH&S applicant is focused on *environmental* sustainability and understands how to advance their efforts in reducing the company’s impact on the environment. In other words, knowing what tactics and tools are available to implement and measure sustainable progress in greening the company’s bottom line becomes crucial to a company’s sustainability program.

Much of what we provide to our students about real-world sustainability comes from the literature and/or from guest lecturers from industry who are truly the experts in implementing sustainable practices in companies and organizations every day. Fortunately, there are also reputable sources who have done some of the research on how we measure sustainability today and some of the best are profiled here.

Perhaps one of the most knowledgeable researchers on environmental sustainability is Eric Nitzberg who most recently wrote about ways to measure environmental sustainability in *The Stanford Social Innovation Review (Online)* (January, 2016). What is important about his research is that he covers a broad array of survey tools available for corporations and non-profits which provide a level playing field for sustainability comparisons both within, and across industry sectors. His conclusions are that this cross-section of sustainability measuring instruments provides excellent information about the way a company manages and minimizes its impact on the environment.

But, Nitzberg also cautions that we should also consider such measuring tools with a certain cynicism because, most companies invest heavily in creating a positive public image, which may or may not be accurate (insofar as being a truly transparent portrayal of their environmental sustainability). Realize that companies are under no obligation to follow any type of standards when they write those reports so how would we evaluate the best answer to the HR interview question: *what are ways you can suggest to measure our company’s sustainability efforts?*

It turns out, Nitzberg and several other academic researchers have found that there are organizations (like **LEED**, for instance) who have established some common standards to help companies and agencies answer this very question. Among these organizations are these that Nitzberg recommends for most businesses because their standards can be “measured” across many different types of industries and are relatively easy to manage from the staff level all the way up to the executive directors whose names go in the Quarterly and Annual Reports.

In no particular order, here then are four organizations which Nitzberg says offer good measurement tools for determining just how effective a company’s sustainability programs are with a brief summary of their

usefulness: First, the **Global Reporting Initiative (GRI)** is an international nonprofit that provides a framework for corporate sustainability reporting. Many large companies already use GRI’s guidelines which cover the key areas of governance, environment, financial, and social impact.

Another sustainability assessment tool recommended by Nitzberg is **B-Labs**, a nonprofit that has created a comprehensive online assessment tool that offers certification to companies that earn 80 out of a possible 200 points on the assessment. They also offer an objective way of comparing corporate sustainability across different industries.

Sustainability Accounting Standards Board (SASB) is a US-based nonprofit that is creating accounting standards for sustainability. One way to understand its mission is to look at the universally agreed-upon standards that exist for financial accounting and reporting in the US today. SASB is working to create similar standards to account for sustainability. (See also IJAAP below)

And, finally, there is the **Dow Jones Sustainability Indices (DJSI)** which are indices that evaluate sustainability of the largest 2,500 companies in the world. To create them, Dow Jones partnered with **RobecoSAM**, a Swiss sustainable assets manager, which did (and does) the research that forms the indices’ foundation. The indices are specifically focused on sustainability factors that will materially impact the company’s financial performance—what RobecoSAM calls “financially relevant sustainability criteria.” Thus the DJSI focus on sustainability factors that are expected to impact long-term financial viability of a company.

Currently, there are 59 different versions of the assessment tailored to different industries so, for that reason, the DJSI would seem to be a priority for job seekers to learn about if they want to be truly prepared to answer the question, *‘what method would you recommend to measure our company’s sustainability progress?’*

OTHER SUSTAINABILITY MEASUREMENT SOURCES

As noted before, there are numerous refereed Journal articles in the literature that deal with the concept of how to measure sustainability in companies and public agencies. One of the best that deals with measuring ‘sustainability’ is, *An Extended Performance Reporting Framework for Social and Environmental Accounting* by Kittiya Youngvanich and James Guthrie which appeared in the *Journal of Business Strategy and the Environment*, (2006). This particular paper is just one that deals most directly with measurement indices for industrial manufacturing companies but there are many more that will be of interest if you want to be up to date with measurement techniques for sustainability, some of which are written from a whole different point of view.

For instance, also appearing in a later *Journal of Business Strategy and the Environment* (October, 2007), is a rather ‘quirky’ sustainability paper titled, *Dart Boards and Clovers As New Tools In Sustainability Planning and Control* by Massimiliano Bonacchi. It takes a somewhat humorous approach to managing sustainability programs in some specific circumstances that are less flexible for use across a wide range of applications.

InderScience.com is an ONLINE publishing site, among others, which publishes some of the papers for the *International Journal of Accounting, Auditing and Performance Evaluation (IJAAP)*. They frequently publish research papers on sustainability accounting methodologies one of which is, *Integrative Management of Sustainability Performance, Measurement and Reporting* by Stefan Schaltegger and Marcus Wagner, (2006). This refereed paper explains how sustainability indices can be crafted from standard financial accounting principles and would be important to financial analysts who have to provide reports on the financial impact of a company’s sustainability programs. (See also SASB above)

Another *Business Strategy and the Environment* publication in March, 2009 featured a paper by Graham Hubbard titled *Measuring Organizational Performance: Beyond The Triple Bottom Line* which deals with the familiar 3-legged-stool of sustainability: social, environmental, and financial, the 3 critical elements which impact the greening of the bottom line. Many companies have adopted the principals of the Triple Bottom Line (TBL) in their sustainability programs and this paper helps to set standards for measuring that TBL. (See also Wikipedia for further explanation for a historical TBL perspective).

As noted earlier, there are hundreds of papers and literally dozens of measurement instruments that are covered in the literature, each having their own applications that may be specific to your needs. What I have recommended here, especially the four systems that came from the Nitzberg research, is meant to provide job seeking EH&S professionals with basic answers to the question: *how do you measure a company’s environmental sustainability?* The information is provided here in the interest of ensuring that our environmental footprint gets smaller for the future of 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.



Larry Olson, PhD.

IT'S ALL ABOUT CHEMISTRY

EXPLODING BATTERIES

We've all come to rely upon constantly being connected. Turning off your phone on an airplane creates almost as much stress as smokers not being allowed to light up a generation ago. And just like smokers, once the plane lands everyone immediately needs a "hit" and out come the phones. Unless, that is, your phone is a Samsung Galaxy Note 7, in which case it didn't even make it onto the airplane.

In the intense competition to create a better, faster, more powerful phone, Samsung released the Galaxy Note 7 in August 2016. Soon there were scattered reports of phones that caught fire or even exploded. On September 2, 2016 Samsung called a news conference and claimed that the issue was "a tiny problem in the manufacturing process." On September 15, the Consumer Product Safety Commission issued a formal recall for Galaxy Note 7 phones sold in the U.S. At first, Samsung shipped replacement phones with batteries from another supplier, but when even these began to catch fire, the company shut down all production of the phone on October 2, effectively killing it. With reports continuing about exploding phones, the FAA issued an emergency order on October 19, banning all Galaxy Note 7 phones from commercial flights and labeling them as a forbidden hazardous material.

What happened? How did Samsung let such a defective product get to market? Part of the answer is the competition noted above. The Galaxy Note 7 had features such as an iris scanner, enhanced stylus, and 16% more battery life, making it a formidable challenger to the latest version of the iPhone. Like with so many portable devices, more battery power, longer life and faster recharging was the holy grail to support these new features.

Li ion batteries have unique advantages over other

common sources such as alkaline or Ni metal hydride batteries. The common elements of all of these batteries is an anode (where an oxidation reaction occurs that releases electrons which move through a conductor to the cathode), a cathode (where a reduction reaction occurs when electrons arrive), and an electrolyte. The electrolyte plays two roles: isolating the anode and cathode so that electrons have to move through a wire rather than reacting directly and allowing the positively charged cation created at the anion to move towards the cathode in order to maintain electrical neutrality.

Lithium is the lightest metal known and is very easily oxidized to Li^+ . Thus, lithium batteries are inherently very energy dense (providing a large amount of energy per kg). At first metallic lithium was tried as the anode, but it was discovered that recharging created metal dendrites that could penetrate the separator between the anode and cathode and create short circuits. So attention turned to the Lithium ion battery which Sony commercialized in 1991.

In the Lithium ion battery, the anode is a porous carbon (usually graphite, but other forms have been used as well) and the cathode is some type of porous metal oxide, such as LiCoO_2 . The key is that both electrodes are porous and Li^+ ions can move into and out of the electrodes without disrupting the crystalline structure, a process called intercalation. When the battery is discharging, Li^+ moves from the graphite anode to the metal oxide cathode, while electrons simultaneously flow from the anode to the cathode. The opposite occurs when charging. Thus, a fully charged Lithium ion battery has most of the lithium intercalated in the carbon anode, while a discharged battery has most of the lithium in the metal oxide anode.

The electrolyte in a Lithium ion battery is a non-aqueous solution of lithium salts (such as LiPF_6 or LiClO_4) in an organic solvent such as dimethyl carbonate. And here is where the problem of fires and exploding batteries arises. Decomposition of the organic solvent during recharging or caused by catalysis of breakdown products of lithium salts such as LiPF_6 and trace water can produce carbon dioxide. If the pressure is great enough, the battery can burst exposing the flammable solvent. Overcharging can also cause O_2 to be released from the LiCoO_2 cathode. Finally, any puncture of the separator between the cathode and anode can lead to a short which causes the battery to rapidly discharge and cause a fire.

There are solutions to these problems that are being actively pursued and no doubt future batteries will be even safer and more efficient. But the Samsung Galaxy Note 7 experience demonstrates once again that the pressures of global competition, complex R & D that is pushing the envelope of new materials, and outsourcing manufacturing to the lowest cost provider has some built in conflicts regarding consumer safety. As a society we may need to rethink how we regulate the rapid dissemination of such new technologies.

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



Michael C. Ford
Attorney

REGULATORY DEVELOPMENTS: LEGAL NEWS YOU CAN USE

In the run up to the Presidential Election, you may have missed one of the following regulatory developments that might impact your business.

1) PROP 65 AMENDMENTS.

If your company sells consumer products in California (the 6th largest economy in the world!)¹, it will want to be familiar with recent amendments to the Proposition 65 warning regulations.² Many Arizona businesses over the years have been unpleasantly surprised to learn about Proposition 65's applicability to their products sold in California via a not-so-friendly notice from a bounty hunting California plaintiff's attorney demanding thousands in penalties and fees for the failure to properly warn California residents of the toxic ingredients in their products. Rather than propose amendments that might actually further the right-to-know purposes of the law, or dis-incentivize the abuse of Prop 65 by the legal cottage industry that reaps millions in profits off the law each year at the expense of businesses, California predictably made the law even less consumer and business friendly (but more lawyer friendly!).

The labeling regulations provide a safe harbor to Prop 65's "clear and reasonable warning" requirement, and therefore are often relied on by business in meeting the warning requirements. Among the amendments, the rule clarifies the relatively narrow circumstances under which manufacturer can rely on a retailer to satisfy the Prop 65 requirements

(consistent with Prop 65's mandate to minimize the burdens imposed on retailers to satisfy the warning requirements); changes the safe harbor warning language, including to require a warning pictogram, and identification of at least one of the specific chemicals in the product if the warning is not provided on the product itself (a truncated warning without chemical identification is allowed for warnings on the product itself); provides safe harbor requirements for internet and catalog purchases; and requires the warnings to be provided to the consumer prior to or at the time of purchase (rather than prior to exposure).

There is a two year transition period for the amendments to go into effect during which compliance with the current or new requirements is acceptable. Unfortunately, at some point, the new regulations are sure to make your company's compliance efforts more challenging, and may even increase bounty hunter litigation by suggesting ways to challenge warnings that do not meet the safe harbor requirements.

2) EPA'S RETAILER STRATEGY FOR HAZARDOUS WASTE.

Soon-to-be-ex EPA Assistant Administrator Mathy Sanislaus recently blogged out an update on EPA's strategy in enforcing RCRA requirements on retailers.³ For the last few years, EPA and California have cost big box and grocery retailers millions by taking an extremely aggressive stance in forcing the square peg of retailer waste generation into the round hole of RCRA's waste determinations and management requirements.⁴ With a better "understanding of how retailers handle consumer goods that cannot be sold" and "the challenges retailers face when managing goods that are hazardous waste when disposed," EPA announced it intended to cease all enforcement activity in favor of stakeholder meetings to develop a sensible approach. Just kidding. It announced more forthcoming rules and guidance, to include rules for hazardous waste generator "improvements," a rule focusing on pharmaceuticals, and a rule on aerosol cans, plus guidance on recycling aerosol cans and "reverse distribution" (the management of returned consumer goods by retailers). While the paper industry is rejoicing, the impact on retailers remains to be seen. A week later, EPA announced another multi-million dollar enforcement settlement against well-known industrial manufacturing giant ... er ... Whole Foods!⁵

3) HAZARDOUS WASTE GENERATOR IMPROVEMENTS RULE.

Right on the heels of EPA's retailer strategy blog, EPA released a pre-publication version of its "improvements" rule, which does anything but to the RCRA requirements facing retailers. The rule's amendments potentially impact every generator of hazardous waste, not just retailers, as EPA has tinkered with the regulations on waste determinations, labeling, emergency response, waste accumulation, closure etc. With respect to retailers, EPA attempted to provide some relief for episodic generators (facilities that typically qualify as conditionally exempt small quantity generators, to be known from now on as very small quantity generators, but occasionally have a larger quantity of waste to dispose that would trigger large quantity generator status, and associated requirements). Unfortunately, in typical EPA fashion, EPA burdened the new episodic generator provisions with so many requirements as to make them likely rarely useable to retailers. This rule will not be effective in Arizona, or any other RCRA-authorized state, until the State takes action to adopt the new provisions in whole or in part.

Next issue: my predictions for Trump's impact on environmental regulations at the federal level, including the Clean Power Plan, Clean Water Act jurisdictional rule, Endangered Species Act, and more! You won't want to miss it.

1 <http://www.sacbee.com/news/business/article83780667.html>.

2 <http://oehha.ca.gov/proposition-65/cmr/notice-adoption-article-6-clear-and-reasonable-warnings>.

3 <https://blog.epa.gov/blog/2016/09/retail-strategy-a-new-focus-on-hazardous-waste-regulations/>.

4 See e.g. <https://www.epa.gov/enforcement/wal-mart-stores-inc-settlement>, <http://www.sdcda.org/files/99%20Cent%20Only%20%20Settlement%201-6-15.pdf>.

5 <https://www.epa.gov/newsreleases/whole-foods-agrees-improve-waste-management-epa-settlement>.

Michael C. Ford is an Environmental and Natural Resources Law Attorney with the Phoenix office of Snell & Wilmer L.L.P. His practice is focused primarily on regulatory compliance advice and enforcement defense. This article represents Mr. Ford's opinion and is for informational purposes only, and should not be considered legal or professional advice. He can be reached at 602-382-6288 or by email at mford@swlaw.com.

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.



WWW.EPAZ.ORG

Our November meeting featured Sowjanya Chintalapati, Corporate EHS Engineer for Shutterfly, Inc. and she provided an interactive discussion about OSHA's Safety and Health Program Management – the New 2016 Version. In December five of the primary professional environmental non-profits in Arizona will be joining forces to host a big holiday mixer at The Newton. Join EPAZ, the Arizona Association of Environmental Professionals, the Air & Waste Management Association – Grand Canyon Chapter, the Arizona Hydrological Society and the Arizona Riparian Council as we share each other's mission, interact with colleagues and celebrate the opening of The Newton (a re-purposed building, on the light rail). We will also be collecting donations for St. Mary's Food Bank at the mixer.

UPCOMING EVENTS:

December 7, 2016 – Joint Holiday Mixer from 5:30 – 8:30 PM at The Newton. RSVPs are required and a raffle ticket will be given for each item or dollar donated to St. Mary's Food Bank during the event.

December 8, 2016 – Our monthly meeting will feature Phil McNeely, Director, Maricopa County Air Quality Department and he will give us his annual "Director's Air Quality Update"

January 12, 2017 – Our monthly meeting will feature Laura Malone, ADEQ Waste Programs Division Director and she will present on "Tier II Updates"

February 9, 2017 – Our monthly meeting will feature Kirk Craig, P.E., Principal Environmental Engineer, Geosyntec Consultants. He will present on "Quantitative Passive Soil Vapor Sampling"

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



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Alliance Members elected Officers of the Board of Directors for 2017 at the November Alliance Meeting as follows: Chair: Craig McCurry, INTEL; Vice Chair: Mike Denby, APS; Treasurer: Matt Conway, PING; and President: Jim Thrush. The Alliance Advisory Council also elected its officers: Co-Chair: Beverly Westgaard; and Co-Chair: Kale Walch.

The Alliance will co-host the annual Pinal County Air Quality Permit Compliance Assistance Seminar with PCAQCD on Feb. 1st, 2017. For details see our advertisement on Page 4. To contact the Alliance call 480-422-7392.

Greg Bopp
Chair



WWW.SESHA.ORG

Just a reminder that SESH Arizona Chapter membership is free through 2016 but you do need to visit the website www.seshonline.org to sign up under the Membership prompt. Our recently held mini-conference proved to be very educational. Irene Ruberto, MPH PhD with the AZ Department of Health Services presented on the Zika Virus, Alex Lowry with Trinity Consultants presented on ISO14001, and our honored key-note speaker, Mr. Colin Tetreault gave a presentation that was not to be missed! Our continued gratitude goes to On-Semi for hosting the event and to our vendor/sponsors who participated. Portions of the registration went to our scholarship fund.

SESHA's 39th Annual Conference will be in Scottsdale, AZ, April 17-21, 2017. We hope you make plans to join us for this event.

Vicky L. Aviles
AZ Chapter
President



WWW.AWMA-GCS.ORG

The year is drawing to a close, and so is our program for 2016. Our final meeting for the year was on November 15 at Amec Foster Wheeler in Phoenix. Bill Campbell, from Arizona State University's Walton Sustainability Solutions Initiatives presented his work on the diversion of green waste from landfills and how to turn these waste materials into marketable commodities. Several cities and towns in Maricopa County are looking into green waste diversion to extend the lives of landfills and provide other economic benefits.

We will also be co-hosting a joint happy hour in early December with several other organizations. This event has proven to be a hit year after year, so don't miss it! Details will be sent out when they become available. We will also be holding elections for a few board positions early next year. If you are interested in serving on our board, please let us know by using the "contact us" form at www.awma-gcs.org.

Mike Sonenberg, PE
Chair



NEWS BRIEFS

EPA SETTLES WITH WESTROCK CP FOR \$4.6 MILLION

❖ The U.S. Environmental Protection Agency announced recently it has settled with WestRock CP, LLC, which will pay \$1.6 million in cash plus shares of stock valued at nearly \$3 million as partial reimbursement for a hazardous waste cleanup near Prescott, Ariz.

The site is a former wood treating plant located on the Yavapai-Prescott Indian Tribe reservation, and cleaned up by the EPA using its authority under the Comprehensive Environmental Response, Compensation and Liability Act (the Superfund law). In 2012, EPA discovered significant amounts of arsenic and pentachlorophenol-contaminated material at the abandoned site. The Agency spent \$6.1 million removing 4,209 tons of contaminated soil during a two-month-long cleanup.

"This unique settlement was structured to allow the Agency to receive corporate shares instead of a full cash payment," said Enrique Manzanilla, Director of the Superfund Program for the EPA's Pacific Southwest Office. "We are pleased to recover the majority of the taxpayer-provided funds spent on the environmental cleanup on tribal lands."

The shares of stock being transferred to the Agency include 56,064 shares in WestRock CP, LLC's parent company, WestRock Company, and 9,344 shares of a newly established spin-off company, Ingevity Corporation. The EPA will sell the stock once the settlement is finalized in federal District Court. The combined stock current value is \$2,998,406. Southwest Forest Industries Inc. operated the wood treating plant from 1961-1985, and a successor company, Smurfit-Stone Container Enterprises, Inc. went bankrupt, leaving the cleanup

obligations with the current corporate successor, Westrock, CP LLC, a manufacturer of paperboard and paper-based packaging.

Pentachlorophenol, an industrial wood preservative, is extremely toxic and can cause neurological, blood, and liver effects, and eye irritation in the short term and long term impacts on the respiratory tract, blood, kidney, liver, immune system, eyes, nose, and skin. Arsenic, used to formulate a common wood preservative, can cause gastrointestinal effects, anemia, peripheral neuropathy, skin lesions, hyperpigmentation, and liver or kidney damage in humans.

The consent decree is subject to a 30-day public comment period. To view the consent decree or to submit comments, please visit: <https://www.justice.gov/enrd/consent-decree/us-v-westrock-cp-llc>.

ADEQ AWARDS NEARLY \$34,000 IN BROWNFIELDS GRANTS TO CITY OF PEORIA FOR OLD TOWN REVITALIZATION

❖ ADEQ officials announced today two Brownfields Grant awards (\$4,998 and \$28,975) to the City of Peoria to perform Phase I/II environmental site assessments (ESAs) at the former Peoria Dry Cleaners and Laundry located in the area of the city's Old Town redevelopment plans at 10456 N. 83rd Ave.

Previous ESAs identified contaminants commonly associated with dry cleaning operations. ADEQ's Brownfields Grant awards are supporting the City of Peoria's plans to revitalize the downtown economy and redevelop Old Town. Work funded by the Brownfields Grants will help determine the extent of the contamination and inform redevelopment decision-making.

ADEQ Brownfields Assistance Program: Established in 2003, ADEQ's BAP conducts projects through Arizona's State Response Grant using funds provided by the Environmental Protection Agency. The program has funded more than 70 projects, assisting entities from local governments, schools, hospitals and nonprofits to tribes in completing environmental assessments, cleanup and restoration.

Redeveloping brownfields has the potential to reduce environmental hazards, mitigate public health threats, create new business opportunities, increase tax revenue and restore habitats and blighted areas to productive use. Program funds are limited and available to eligible applicants in the order that they apply and qualify. To learn more about the grant or to apply, contact: Jennie Curé at 602-771-2296.

EPA EXTENDS PUBLIC COMMENT PERIOD FOR EVOQUA CARBON REGENERATION FACILITY NEAR PARKER, AZ

❖ The U.S. Environmental Protection Agency announced recently is extending the public comment period on its proposed hazardous waste permit for Evoqua, a commercial carbon regeneration facility on the Colorado River Indian Tribes reservation near Parker, Arizona.

The public comment period has been extended through January 9, 2017.

The Evoqua facility has been operating since the mid-1990s, treating spent carbon in a regeneration furnace to purify it and make it available for reuse as a commercial product. EPA's proposed permit, if finalized, will be valid for 10 years and will allow Evoqua to store and regenerate carbon, some of which is contaminated with hazardous waste.

A permit ensures that the facility will operate in a manner to

Continued on next page

JOURNAL OF Environmental Management ARIZONA

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NEWS BRIEFS

CONTINUED FROM PREVIOUS PAGE

protect human health and the environment. The facility is currently operating under interim hazardous waste regulatory requirements. The proposed permit will impose stricter requirements that Evoqua must follow, including the most stringent environmental controls for this type of facility in the nation.

EPA will make a final decision on the permit after carefully considering all public comments submitted.

For more information on the proposed permit and to submit a comment, please visit: www.epa.gov/az/evoqua.

BABBITT RANCHES AND C.O. BAR AGREE TO INVESTIGATE ABANDONED URANIUM MINES IN COCONINO COUNTY

❖ The U.S. Environmental Protection Agency announced recently it has finalized a settlement with Babbitt Ranches, LLC and C.O. Bar, Inc. in which the companies committed to conducting a site evaluation of abandoned uranium mines adjacent to the Little Colorado River.

“Babbitt Ranches stepped up to conduct

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this investigation, consistent with their longstanding stewardship values,” said Enrique Manzanilla, Superfund Director for the EPA’s Pacific Southwest Office. “Today, the mines are closed, but the legacy of uranium contamination remains.”

The site evaluation will include an assessment of the abandoned uranium mines and surveys of cultural and biological resources. Once the evaluation is complete, EPA will consult with the Arizona Department of Environmental Quality and the neighboring Navajo Nation to determine any additional actions that may be required.

Under the settlement agreement, the companies also agreed to pay the agency \$230,000 in past costs incurred and future oversight costs. This agreement is made under authority of the Superfund law, which holds landowners responsible for hazardous materials on their properties and requires them to provide cleanups of historic contamination.

This settlement is part of a larger strategy to address abandoned uranium mines on and near the Navajo Nation. From 1944 to 1986, nearly 30 million tons of uranium ore were mined on or adjacent to the Navajo Nation, resulting in more than 500 abandoned uranium mines. Since 2008, EPA and five other federal agencies invested more than \$130 million to reduce the highest risks to Navajo people by conducting initial investigations at all the mines, remediating 48 contaminated structures, providing safe drinking



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water to 3,013 families, cleaning up groundwater at mill sites, and performing cleanup or stabilization work at 9 mines.

For more information, please visit: <https://www.epa.gov/navajo-nation-uranium-cleanup>.

US EPA AWARDS MORE THAN \$1.6 MILLION IN ENVIRONMENTAL RESEARCH FELLOWSHIPS TO 13 STUDENTS IN ARIZONA, CALIFORNIA, HAWAII, AND NEVADA

❖ The U.S. Environmental Protection Agency announced recently more than \$1.6 million in Science to Achieve Results (STAR) graduate fellowships for 13 students at universities in Arizona, California, Hawaii, and Nevada. The fellowships, which will allow these students to further their education while conducting environmental research, were part of over \$6 million awarded to 52 students across the nation.

“Through EPA’s funding, the STAR fellows will pursue innovative research projects while attaining advanced academic degrees,” said Alexis Strauss, EPA’s Acting Regional Administrator for the Pacific Southwest. “The work these students are doing is inspirational, and will help address environmental challenges in fields such as atmospheric chemistry, green energy, hydrogeology and toxicology.” STAR fellowship recipients in the Pacific Southwest will address the following projects:

ARIZONA

Arizona State University: 1 award, Project title: A Study of the Aqueous Phase Processing of Organic Aerosols through Carbon Stable Isotope Analysis, Award amount: \$132,000

University of Arizona: 1 award, Project title: Uncertainty for America’s Coasts: The Future of the Atlantic Meridional Overturning Circulation, Award amount: \$132,000

CALIFORNIA

Stanford University: 2 awards, Project title: Drinking Water Security in Times of Drought and Beyond: Improved Prediction, Management, and Decision-Making Tools for Water Distribution in Southern California, Award amount: \$132,000. Project title: Persistence of Environmental DNA in the Marine Environment, Award amount: \$132,000

University of California, Berkeley: 5 awards, Project title: Assessment of Advanced Water Treatment Processes to Promote Safe, Stable Microbial Communities in Direct Potable Reuse Distribution Systems, Award amount: \$132,000. Project title: Understanding Secondary Organic Aerosol Formation from Biomass Burning through Time-Resolved Speciated Volatile and Semi-Volatile Organic

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Compound Measures, Award amount: \$132,000. Project title: Identifying Environmental Pollutants that Alter the Stress Response, Award amount: \$132,000. Project title: Human Productivity in a Warmer World: The Impact of Climate Change on the Global Workforce, Award amount: \$132,000. Project title: Characterization of Mobile and Ambient Nitrogen Dioxide Emissions in California, Award amount: \$132,000.

University of California, Davis: 1 award, Project title: Assessing the Supply of Mercury from Artisanal and Small-scale Gold Mining Activities, and its Fluvial Transport and Methylation in Madre de Dios, Peru, Award amount: \$88,000.

University of California, Irvine: 1 award, Project Title: How Does the Endocrine Disruptor Tributyltin Commit Mesenchymal Stem Cells to the Adipose Lineage?, Award Amount: \$132,000.

HAWAII

University of Hawaii, Manoa: 1 award, Project Title: The Dynamic Interaction of Nutrient Pollution and Seawater Temperature on Reef Corals: Is Nutrient Enrichment Undermining Coral Resilience?, Award Amount: \$132,000.

NEVADA

University of Nevada, Reno: 1 award, Project Title: Desert Diesel: Engineering Opuntia Ficus-Indica as a Low Input Biofuel Feedstock, Award Amount: \$132,000.

2016 December 7

Joint Holiday Mixer: Co-Hosted by EPAZ, AZAEP, A&WMA, AHS & ARC

Time: 6:00 PM to 9:00 PM

Location: The Newton, 300 W. Camelback Road, Phoenix, AZ
FOOD DRIVE benefiting St. Mary’s Food Bank

2016 December 8



Luncheon Featuring: Speaker: Phil McNeely, Maricopa County AQ Director
Topic: “Director’s Air Quality Update”.

Sponsor: Environmental Response, Inc.

Location: SRP Pera Club, 1 E. Continental Drive, Tempe, AZ

2017 January 12



Luncheon Featuring: Speaker: Laura Malone, ADEQ Waste Programs Director

Topic: “Tier II Updates”.

Sponsor: ACTenviro

Location: SRP Pera Club, 1 E. Continental Drive, Tempe, AZ

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