

# CHASTAIN-SKILLMAN, INC.

ENGINEERS • ARCHITECTS • SCIENTISTS • SURVEYORS

## CONSULTANT'S UPDATE

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### CONSTRUCTION STAKING

By Richard M. "Mike" Benton, PSM



In recent years, planners and engineers have had to exercise greater creativity to produce residential, commercial, and infrastructure project designs that are capable

of providing economic success while being aesthetically pleasing and environmentally friendly. These designs are frequently characterized by a whole different approach that brings with it a new set of challenges for surveyors to accurately provide construction staking to implement the design.

Historically, construction staking was straight-forward. Typically, a land surveyor was requested to stake features that

were straight and rectangular in shape with a small number of stakes required to facilitate construction of the design as planned. Current designs tend to contain many curved features and have a low tolerance for errors. Thus, the contractor requires accurate field staking to be able to construct the features correctly.

One example of creative design can be found in most new retention ponds. With land cost at a premium, retention ponds have become more intricate in design and shape to provide the required storage capacity with as little land area impact as possible. Another example is seen on roadway projects. In years past, roads would typically consist of straight sec-

*(Staking—Continued on page 2)*

### ASSESSING HAZARDS AND PPE SELECTION

By Debbie L. Vilar, MBA and Chuck Roberts



Each year, thousands of American workers suffer injuries, illnesses, or death on the job. To assist employers and employees in implementing regulatory compliance require-

ments aimed at reducing such occurrences, OSHA has published Non-mandatory Compliance Guidelines for Hazard Assessment and Personal Protective Equipment (PPE) Selection (29 CFR 1910 Subpart I Appendix B). Although these guidelines are helpful, they should not be used as a substitute for a thorough knowledge of the environmental, health, and safety aspects of PPE selection, as there are nuances not fully explained in

the guidelines. Additionally, PPE should be used in conjunction with an appropriately designed Health and Safety Program or Plan. It should also be noted that employers are required to first utilize engineering controls to reduce worker exposure to hazards to the extent technically and economically feasible (e.g., shielding workers with sound insulation as opposed to requiring workers to wear hearing protection). Appropriate PPE is then selected to mitigate remaining hazards.

In selecting PPE, it is very important to match the particular characteristics of various types of PPE to the specific hazard (e.g., different types of gloves are required to mitigate cut or chemical expo-

*(PPE—Continued on page 3)*

*On October 26, 2009 CSI held its first annual pumpkin carving challenge. Three brave teams worked against the clock before an audience competing for recognition and prizes in four categories: Best in Contest, Scariest, Funniest, and Most Creative. All attendees had a great time!*



#### Inside this issue:

Construction Staking	1
Assessing Hazards and PPE Selection	1
GWR Goes Into Effect December 1, 2009	4
Toys for Tots	5
Sustainability: What is it, really?	6

*(Staking—Continued from page 1)*

tions, with few curves. Now, roadways are more frequently curved, with multiple radii and reverse curves common to maximize lot yields for subdivisions. This dramatically increases the difficulty and amount of construction staking required to support accurate construction of the project.



Storm system designs have also changed. Past designs typically required staking the stormwater control structure location at each end of the pipe run, which would provide enough guidance for the contractor to install the pipe. Now, with integrated curved designs intended to reduce the amount of impacted area and protect environmentally sensitive areas, multiple control points are needed to define the location of the curved sections of the pipe.

Due to the more creative designs, and designers generally providing less information on the plans to reduce the cost of designs, the surveyor must be more imaginative with their approach to staking the design features. One way to address this requirement is to increase the frequency of stakes to delineate a certain feature, along with the approach to pre-

calculations to expedite the field effort. Another method, which Chastain-Skillman has adopted, is to transfer AutoCAD and other electronic data files directly to the field crew on the construction site. This reduces the need for the survey crew to interpolate data shown on the plans, and bridges the gap from the plan to the finished product on the ground.

When Chastain-Skillman surveyors receive plans for a new project, one of the key quality control steps we take is to review the staking increments needed to delineate certain project features, and look for possible conflicts within the design. Potential issues can then be proactively communicated to the designer and/or client for resolution prior to performing work in the field.

In summary, to remain competitive, project planners and designers have had to become more creative and employ design features that are different from historical practices. While these changes have posed new construction staking challenges for surveyors, creative approaches to communicating information and meeting construction contractor needs for guidance in the field have allowed our survey crews to help make these residential, commercial, and infrastructure projects technically and economically successful ventures for all involved.

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## EOHS NEWS

- ◆ Updated OSHA Personal Protective Equipment (PPE) standards went into effect on 10-09-09. The new standards revise requirements for eye, face, head, and foot protection in general industry. Additional information is available at: <http://edocket.access.gpo.gov/2009/E9-21360.htm>
- ◆ In September, 2009, OSHA proposed a rule that would align its hazard communication standard (HazCom) with the Globally Harmonized System for Classification and Labeling of Chemicals (GHS). GHS will be phased in over three years. There is no proposed date of release for the final rule; however, the comment period for the proposed rule ends 12-29-09. Additional information is available at: [www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=FEDERAL\\_REGISTER&p\\_id=21110](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=FEDERAL_REGISTER&p_id=21110)
- ◆ OSHA released a new guidance document in September, 2009 that provides information employers can use to reduce worker exposure to silica on construction sites. "Controlling Silica Exposures in Construction" is available at [www.osha.gov/Publications/3362silica-exposures.pdf](http://www.osha.gov/Publications/3362silica-exposures.pdf)
- ◆ OSHA announced in mid-October, 2009 that it would soon issue a compliance directive intended to ensure uniform H1N1-related inspection procedures for workers in high- to very high-risk occupations. The directive would closely follow the CDC's interim guidance ([www.cdc.gov/h1n1flu/guidelines\\_infection\\_control.htm](http://www.cdc.gov/h1n1flu/guidelines_infection_control.htm)). OSHA inspectors would be responsible for ensuring that workplaces implement a hierarchy of controls. Workplaces that distribute respirators to employees must follow the OSHA Respiratory Protection standard, which includes worker training and fit testing.
- ◆ EPA Proposes Greenhouse Gas (GHG) Regulation for Large Facilities. This proposal would require large facilities that plan to construct or modify existing plants to obtain construction and operating permits that demonstrate the use of best practices for curtailing emissions. The new rule would apply to facilities that emit at least 25,000 metric tons of GHG per year, such as power plants, refineries, and factories. Small businesses would not be required to obtain the permits. The agency stated the rule targets nearly 70% of the US stationary sources and would affect approximately 14,000 existing facilities nationwide. Additional information is available at: [www.epa.gov/nsr/actions.html](http://www.epa.gov/nsr/actions.html)

(PPE—Continued from page 1)

sure hazards, and different materials of construction are required to provide protection from different chemicals). Thus, proper PPE selection requires a combination of identifying and understanding the hazards, knowledge of PPE performance characteristics, and a good degree of common sense.

To adequately identify and characterize the hazards to which a worker may be exposed, both the environment and the worker's assigned tasks must be considered. Where feasible, a site walk-through can be very helpful in making such determinations; however, a site walk-through may not be possible without first specifying PPE. All three exposure routes for potential chemical exposure should be considered (i.e., inhalation, dermal exposure, and ingestion), as well as physical hazards (e.g., impact, penetration, compression, heat, and electrical energy), with specific attention to protection of the foot, head, eye, face, and other specific body parts that could be injured in performing the assigned job duties.

Consideration should also be given to the possibility of simultaneous exposure to multiple hazards, and how this may influence the selection of appropriate PPE (e.g., conditions of extreme heat may make some approaches to reducing chemical exposure infeasible, or necessitate additional mitigation measures such as frequent breaks). In selecting PPE, adequate protection against the highest level of each identified hazard should be provided, and specific thresholds should be established for upgrading the level of PPE if conditions encountered on the job differ from those that are anticipated (e.g., transitioning from a cartridge respirator to a self-contained breathing apparatus if the presence of hazardous chemical vapors exceed a specified concentration at which the cartridge respirator is no longer adequate).

In order for PPE to provide the intended protection, it is also important that the PPE properly fit the employee, and that the employee understand how to properly wear and use the PPE, as well as understand its limitations. Cer-

tain types of PPE, such as respirators, may not be used without proper training and fit testing, and require considerable maintenance.

In many cases, the use of PPE can adversely impact a worker's dexterity, field of vision, and other abilities to sense hazards and move about effectively, as well as place additional physical stress on the employee (e.g., the use of a respirator can make breathing more laborious). Thus, consideration must also be given to managing work assignments in a manner that accounts for these collateral risk factors.

In summary, PPE can be very effective at reducing potential risks to worker health and safety. Guidelines are available to assist in assessing job hazards and selecting appropriate PPE, but care must be taken to consider a wide range of factors to properly mitigate the identified hazards

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Respirator

## RECENT PROJECTS AND CONTRACTS OF INTEREST

- CSI recently completed the design of new infrastructure to improve water supply, treatment, and storage for the City of Wauchula. This project includes a new potable supply well, raw water transmission main, aerators, clearwell, and overhaul of the water plant's electrical system. CSI worked closely with City staff to secure American Recovery and Reinvestment Act (ARRA) funding for the \$4 million project. Construction began in December 2009.
- Hillsborough County has selected CSI to provide ongoing engineering and asbestos management services.
- Okeechobee County has selected CSI to provide ongoing engineering services.
- Dr. Jim Chastain, PE recently presented several lectures on Quantitative Health Risk Assessment at the University of Florida's Environmental Engineering Department. The lectures to graduate and honors undergraduate classes were part of the courses' effort to show the interrelation of environmental pollution and the relative impact on human health.
- CSI has recently been asked to deliver yet a second project for the FDEP at their Atlantic Ridge Preserve State Park.
- The City of Lakeland recently awarded CSI the project of producing an Engineering Study of the Highlands Ground Storage Reservoir and Water System.

With the onset of the New Year, Chastain-Skillman will celebrate 60 YEARS of providing engineering, surveying, architecture, and scientific services to clients in Florida and throughout the southeast. CSI also provides services nationwide and internationally for select clients.

# GWR GOES INTO EFFECT DECEMBER 1, 2009

By David J. Buyens, PE and Salah F. Albustami, PE



On November 8, 2006, the Environmental Protection Agency (EPA) issued its final Ground Water Rule (GWR) via the Federal Register in the form of revisions to 40 CFR Parts 9, 141, and 142. Hence, all Florida Public Water Systems (PWS) that use groundwater will have had to comply with the GWR beginning December 1, 2009. In large part, because the Florida Department of Environmental Protection (FDEP) will not incorporate the new Rule into the Florida Administrative Code until sometime in late 2010, a year after the GWR goes into effect, most PWS will find themselves scrambling to attain compliance in a short time with minimal support.

The GWR was promulgated to provide for increased public health protection against bacterial and viral pathogens and contains requirements for sanitary surveys, groundwater source microbial monitoring, treatment techniques, compliance monitoring, and public notification. As in the past, the sanitary surveys are primarily the responsibility of the FDEP or local health departments, while the PWS are responsible for the other requirements.

### Who, When, and How to Comply?

All PWS that use only groundwater sources, consecutive PWS (PWS that supply other PWS), or PWS that use both surface and groundwater sources\* (including community and non-community systems regardless their sizes) are required to comply with the GWR.

Figure 1 depicts the compliance timetable for implementation of the new rule, beginning December 1, 2009.

*\*Except systems that combine all of their groundwater with surface water prior to treatment of surface water under Surface Water Treatment Rules.*

### Two Paths Toward Compliance

The GWR provides two options for attaining compliance: either a four-log virus treatment of the groundwater source, or source water monitoring. The most advantageous approach will depend largely on characteristics of the PWS.

With regard to the four-log virus treatment of the groundwater prior to consumption, the PWS can use any of the treatment techniques (chlorine, filtration, and UV) alone or combined to achieve the needed level of treatment. The FDEP has provided draft guidelines (Four-Log Treatment of Ground Water) that explain the use and level of compliance of the above treatment techniques. However, a professional engineer registered in the State of Florida must submit a plan to the FDEP and obtain approval to avoid source water monitoring, the second option. Both continuous and daily monitoring of the processes may be required. Hence, small PWS that are not required to have water plant operators on site will not likely be able to utilize this option. Consecutive systems (PWS that supply other PWS), those who use lime-soda processes to soften 100% of the water, or other larger PWS are prime candidates for this option.

The second option for compliance is the default, source water monitoring. Samples must be analyzed at least monthly representing all wells. Source water sampling is required for two reasons: either routine assessment samples, or triggered

by a positive coliform result from the current distribution sampling. Although such additional sampling will necessitate additional expense, the greatest potential impact is the Tier 1 notification (television and radio) required of any source sample testing positive. No amount of re-testing or corrective action can alleviate the Tier 1 notification process—only the laboratory admitting to an error can negate notification. Additional sampling pertains only to corrective action requirements.

By December 31, 2012 for community PWS, and two years subsequent to that for non-community PWS, it will be necessary to complete the initial eight-element sanitary survey for all PWS under the GWR. Prior to the date deadlines, PWS will have to provide existing information that is requested by the FDEP, enabling the FDEP to conduct a sanitary survey, which must include evaluation of following eight elements, as applicable:

1. Source
2. Treatment
3. Distribution System
4. Finished Water Storage
5. Pumps, Pump Facilities, and Controls
6. Monitoring, Reporting, and Data Verification
7. PWS Management and Operation
8. Operator Compliance with FDEP Requirements

### Pathogens Monitored

Three analytical methods are accepted for triggered or assessment monitoring of source water for fecal indicators: E. coli,

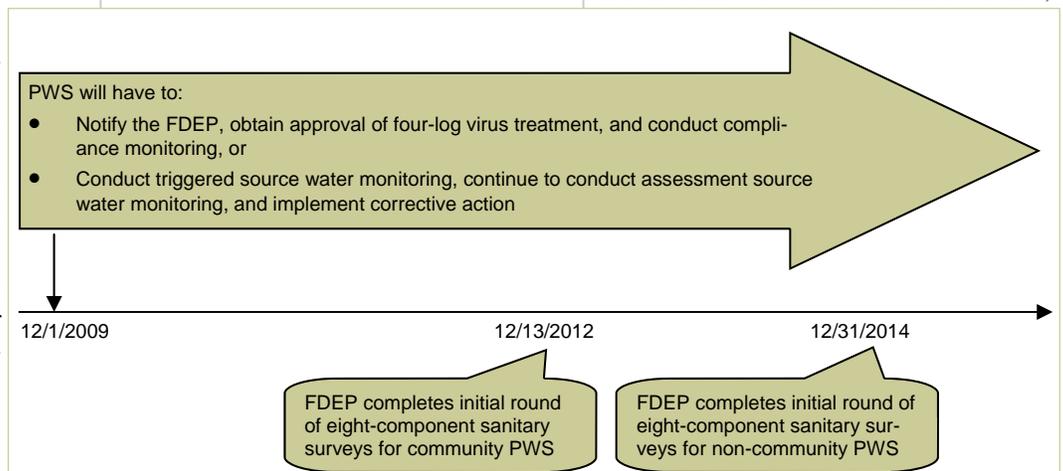


Figure 1 Implementation Timeline

(GWR—Continued on page 5)

## EMPLOYEES STAYING FIT

CSI has a few employees taking fitness to the next level. Kristen Buzzanca, Contracts Manager, was recently part of a relay team of runners that ran a 203-mile course across the state of Florida from New Port Richie to Daytona Beach. Dave Buyens, Senior Project Manager, is currently in second place nationally in the Ultra Marathon Cycling Association's (UMCA) competition of mileage ridden only on 100-mile or longer rides. Dave has amassed over 10,500 miles through November, on 102 century rides. Allan Duhm, Business Development Director, recently set a UMCA record for crossing the state of Florida on a bicycle, covering the 400 miles from Jacksonville to the Alabama line near Pensacola in 25.5 hours.

(GWR—Continued from page 4)

Enterococci, or Coliphage. Most PWS will probably analyze for E. coli because of familiarity and cost. The cost of the Enterococci method is about 50% higher than the E. coli analytical procedure. Still more expensive is the Coliphage - up to 15 times the cost of E. coli. However, Coliphage might be a better indicator than the other two because Coliphage more closely resembles viruses in size and shape. Hence, Coliphage might be transported through aquifers similar to viruses. Also, it is unlikely that Coliphage can grow in the warm Florida environment, as might the other two. False positives would be less likely when analyzing for Coliphage. The choice is at the discretion of the PWS doing the sampling.

### Conclusion

Only about 11% of PWS in Florida experience one or more total Coliform positive results when routine samples are analyzed from their distribution system. Hence, eight of nine systems should not have to perform triggered sampling in any given year. Assuming the percentage of systems sampling raw water for fecal indicators is no higher, most systems will not experience ill effects from the GWR other than increased analytical

costs. The remainder of the PWS may require corrective actions, possibly including water plant upgrades. For example, some wells may have to be replaced or new treatment processes may need to be engineered and brought on line to meet the GWR. Each system should have an idea of how well their facility will fare and should take this assessment into account when deciding how to comply with the GWR.

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## TOYS FOR TOTS

'Tis better to give than to receive is the CSI Lakeland Environmental Department's credo this season.

The Department members decided that rather than their traditional gift exchange, they would apply those same funds toward helping needy children have a more Merry Christmas this tough holiday season.

Glenn Folsom, Chris Medley and Art Wade pitched in and did the shopping for the department, which also includes Paul Bizier, Sal Albustami, Steve Dutch, Betty Fisher, Ted Fylstra, Jerry Handley, Doug Jones, Lisa Lassi, Mike Leffler, Dr. Jerry Murphy, Pama Pixley, Tony Roberts, Mike Schenk, Doug Thaggard, and Corbett Watson.



## SUSTAINABILITY: WHAT IS IT, REALLY?

By Chuck Roberts



### Background

The global movement toward a higher state of environmental consciousness has morphed through various phases of awareness and commitment over the last few decades, and has recently been picking up speed in a new direction. Many years ago it took the form of back-end waste minimization, transitioned to front-end pollution prevention, then began taking on the green color largely with back-end reuse (generally defined as re-using waste without treatment) and recycling (generally defined as re-using waste following treatment). It then moved forward again in the process chain to materials substitution in design and manufacturing processes, and has finally migrated to what is perceived by some as a utopian condition generally characterized as “sustainable operations.”

This trend toward sustainability is unmistakable, likely needed, and virtually unstoppable, as it is now programmed into our children's minds. Case in point: I came home from work one day to find my eight-year-old daughter (who seems like she's 12) putting the finishing touches on a beautifully designed, hand-crafted business card bearing her name, drawings of a flower and a horse, and the title “Recycling Coordinator.” She proudly announced that our family would be stepping up our efforts to achieve sustainability to include recycling a wider range and larger volume of waste materials, and that we would henceforth be more conscientious about turning off the water while brushing our teeth, re-using scraps of paper for notepads, and the like. Taking it a step further, several nights later, she told me to turn off the bathroom light or I might kill a polar bear (by melting the ice cap with my unbridled use of fossil fuel-generated electric power, of course). Our kids are acutely aware of our interrelationship with the environment and get it...but, do we?

In both the government and private sectors, an increasing number of organizations are naming individuals to serve as their Sustainability Manager, and consulting firms are self-proclaiming their expertise and naming Vice Presidents of their Sustainability Practice. Yet, amid all the fervor associated with organizations rushing toward this goal, and as consulting firms prepare to do battle with each other over contracts to guide these well intentioned clients, it is surprising how many people from both the client and consultant community have privately approached me at professional conferences and networking meetings to confess that they don't really understand what sustainability means. In answer to these private calls for help, I offer this article.



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### The Global View

Sustainability was initially conceived as meeting the needs of the present without compromising the ability of future generations to meet their own needs. However, the term has evolved to describe a broader concept of ethical management that has, in essence, replaced what was formerly called Corporate Social Responsibility. In its latest form, sustainability is characterized as having three key components, sometimes called the triple bottom line: economic, environmental, and social. A sustainable organization is one that is forward-looking, takes these three components into careful consideration in developing and implementing its policies and procedures, and seeks to conduct its business in a manner that simultaneously enhances all three of these components, making them an integral part of its operational priorities. Thus, working to-

ward a goal of sustainable operation has become widely accepted as an approach to sound public and private sector management.

Substantial interest in sustainability materialized about a decade ago. In fact, Dow Jones established a series of Sustainability Indexes in 1999 to track the financial performance of leading sustainability-driven companies worldwide. The general philosophy espoused by Dow Jones was “What gets measured, gets done” and it was Dow's view that this was important.

More recently, a number of driving forces have accelerated the adoption of sustainability-oriented management practices. These driving forces have included:

- public pressure for greater transparency stemming from notable ethics violations by governmental officials and public corporations;
- climate change reaching the tipping point of acceptance as a real issue with potentially irreversible and dangerous consequences;
- increased globalization, which has thrust us into more direct contact with people of different cultures, economic means, and working conditions; and
- recognition that, as economic globalization raises the standard of living for many lesser developed regions and countries, it will increase the competition for many of the earth's essential, but finite, resources – to the point that critical shortages could result in dire consequences if not addressed promptly.

Under the influence of these powerful driving forces, it is likely that pressure from the public, media, political organizations, environmental advocacy groups, governments, and investors will correspondingly increase our focus on sustainability as a critical success factor for governments and businesses, and the human race.

*(Sustainability—Continued on page 7)*

(Sustainability—Continued from page 6)

## Assessment and Reporting

In addition to practicing sustainability, there is the issue of assessing and reporting one's sustainable initiatives and progress. Presently, such sustainability assessment and reporting are discretionary. However, they are likely to become requirements, whether formal or implied, to qualify for federal funds, garner public support, and raise capital, if not by regulatory mandate (such as is happening with greenhouse gas accounting and reporting). As more organizations adopt sustainability assessment and reporting practices, an organization's lack of such a report may be interpreted by the public as implying that the organization is not ethically managed, or not operated in a socially responsible manner. From a leadership perspective, an increasing number of major organizations, such as PepsiCo, are performing Life Cycle Analyses upstream and downstream of their organization as part of their sustainability assessments, and beginning to require that their suppliers meet various sustainability targets, becoming yet another driving force for sustainability.

In order to promote uniformity and comparability, Ceres (pronounced "series") - a national network of environmental organizations, investors, and other public interest groups - has implemented a Global Reporting Initiative (GRI) that includes Guidelines and 79 standard Performance Indicator parameters (49 core and 30 additional) for measuring and reporting sustainability performance. (There are also industry sector-specific parameters, but a discussion of these is beyond the scope of this article.) The GRI addresses all three components of sustainability (economic, environmental, and social) but expresses the social component as four subcomponents - Labor Practices and Decent Work, Human Rights, Society, and Product Responsibility - yielding a total of six categories for GRI assessment and reporting.

In using the GRI protocol, an organization reports at one of three levels: C, B, or A, in order of increasing content. The GRI specifies minimum standard disclosures for each reporting level, and then allows the organization to select among the 79 Performance Indicators for reporting performance in the six categories. To meet Levels C or B, a minimum of 10 or 20 Performance Indicators must be addressed, respectively. To meet Level A, all core and sector-specific Performance Indicators must be addressed. While not a requirement, the GRI suggests that in selecting Performance Indicators for

Levels C and B, the organization use at least one indicator from each of the six reporting categories. An organization has the option to include additional parameters, from the GRI list or of its own design, beyond the minimum specified number without having to go to the next highest reporting level. The reporting level may be self-declared, or an organization may elect to have the reporting level confirmed by the GRI or another qualified independent party, with the latter choices adding credibility to the rating.

The frequency of reporting and number of years of historical data to include are at an organization's discretion, but the GRI promotes comparability of the reports over time. Thus, it is beneficial for an organization to commit to a regular schedule of reporting, be consistent in addressing the same Performance Indicators from year to year, and carry forward a certain amount of historical data in subsequent years after initiating reporting. The current standard for most organizations is to report biannually and carry forward data for five years.



Persistent drought conditions have made many water bodies unsuitable for recreational activities and have threatened our water supply, emphasizing the need for conservation.

## Summary

Like quality and safety (and getting exercise and eating healthy), sustainable behavior should become an integral part of our lifestyle - something we do without having to consciously think about it. It is that important to our future. Sustainability assessment and reporting provides a mechanism to keep these important issues at the forefront of our decision making, contributes to the needed discipline to make this behavior a part of our daily lives, and can have substantial public relations value. Dow Jones probably had it right...what get's measured, gets done.

Moreover, while the social components of sustainability are important, the naturally available supply of certain essential resources is finite, and some changes to the environment may indeed be irreversible. For many, the reality of these issues can, at times, be tough to accept. However, it is clear that our primary focus in the near term needs to be on responsibly managing resource consumption and potentially irreversible environmental impacts or, one day in the not too distant future, the rest won't likely matter.

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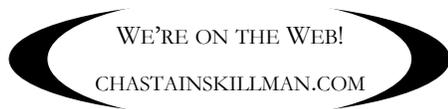
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