Schnabel ENGINEERING

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SCHNABEL MAKES A BIG SPLASH AT ASDSO AND USSD

Schnabel Engineering continued to establish itself as one of the premier engineering firms in dam engineering by presenting and having a major presence at national and regional conferences. Our professionals recently participated in the **US Society on Dams 32nd Annual Meeting and Conference** held in New Orleans, Louisiana, and at the recent **Association of State Dam Safety Officials (ASDSO) Southeast Conference** held in Louisville, Kentucky. Schnabel presented seven papers:

- The Impact of Flooding During the Construction of the Fox Creek Spillway, Aaron Collins and Martin Fister, PE, PLS (Free Contracting, Inc.)
- Adding 30+ Years to a 90-Year-Old Dam, Mark Landis, PG, PE; Alex Rutledge, PG, EI; and Robert Indri, PE
- Dam Foundation Grouting in Piedmont Geology - One Size Does Not Fit All, Gary Rogers, PG; Gerald Robblee, PE; Adam Paisley, EIT; and Mark Landis, PE, PG
- Spillways in 3D; Greg Paxson, PE; Brian Crookston, PhD; and Blake P. Tullis, PhD (Utah State University)
- Fox Creek Multi-Purpose Structure #4: The History and Design Behind a New RCC Spillway, Anthony Grubbs, PE; Laura Sheerin, PE; and Sonya Keith (USDA-NRCS)
- Renovation of the Dog River Dam, Gary Bailey, PE
- Lake Wendy - From Failed to Full in Fourteen Months, James Crowder, PE and Charles Wilson, PE

Look for us next:

HydroVision July 17th thru 20, 2012 in Louisville, Kentucky and at the **ASDSO Dam Safety 2012 in Denver, Colorado, September 16th thru 21, 2012.**

The Water Wire publications archive and reference materials are available via download at:
http://www.schnabel-eng.com/Resources/WaterWire.aspx

Water Wire

SUMMER 2012
Volume 7

From the Director's Chair —

I'VE HAD ENOUGH OF THIS RECESSION!

We remain in the midst of uncertain economic conditions around much of the world. While all of us are affected in some way, we are also the ones that need to draw upon our fundamental human optimism to create the energy and belief in a return to prosperity. Simply believing the economy will get better won't make it happen, but pessimism spreads like a cancer. Let's recognize that the damage done is a thing of the past and it's time for the wounds to begin to heal, heralding a return to good health.

Wouldn't it be nice to recapture the excitement of an expanding economy and a return to hiring, either to fill needed positions that have gone unfilled or to create new positions needed in response to market growth. Please join me in optimistically looking forward to economic recovery, growing markets, a growing share of those markets, and the need to hire both entry level and experienced staff to meet those needs.

I trust many of you share this fundamental sense of optimism and are eager to push the economy forward and be positioned to make new hires. With that in mind, let's get prepared in advance. I'd like to share some basic hiring considerations that seem to apply across a broad spectrum of needs. I have found that there are three common factors to focus on with nearly every candidate that we interview.

Aptitude

To work in the engineering field, whether as an engineer, geologist, CAD professional, resident project representative or other role, it is imperative to have an aptitude for the business. There is just not much that can be done, even with good and otherwise talented people, if they don't have a basic mentality that is compatible with mathematics, scientific principles and computer applications. Being technically bright is the price of admission to be considered for a technical position. Perhaps your business has other key competence factors that need to be met, but the fact is they need to be met.

Attitude

Over the years, I have worked with some very talented people that were also either lazy, unfocused or unengaged. These folks are not going to positively contribute to your organization. I'm looking for responsibility and maturity. When interviewing candidates, I don't focus on resumes. I simply have a discussion and listen for conversational keys that tell me if this individual will wake up wanting to come to work, to learn and grow, to contribute to the team and to share their enthusiasm with others. As a long adherent to the saying, "Do something you love and you will never work a day in your life," † I'd rather do without than to hire people that lack passion and focus. Remember that some express enthusiasm more quietly, but it's none the less there to see.

Trust

For me, trustworthiness is a game breaker. A brilliant and highly motivated candidate that can't be trusted will, at some point, become a malignancy in your organization. Whether it's an ego that takes priority over the organization's goals or someone likely to slip their hand in the till, the interviewer needs to be the gatekeeper. When a devious or self-centered person gets into your workplace, the cost of exorcising them is sure to be high. Therefore, it is imperative that the interviewer use the art of communication to get a sense of each candidate's innate character traits. Assess how they match up with your organization's needs and personality, and judge your comfort in picturing them acting on behalf of your organization.

There are other considerations specific to positions, including education, licensing, a diversity of backgrounds, etc., but the three key elements merge to form a workable clay from which a viable career can be sculpted. Hire people that are smart where you need them to be, reliable and eager to work as part of a team, and of honorable character. The clay with which to craft growth, development, and success will then be in the hands of your organization's leadership. When you hire people that share these traits, it's a delight to help sculpt their development.

Let's focus on getting our organizations directed towards the business of success! Remember that the good candidates are also going to be interviewing you.

The secrets of hiring are clear.
Judge who they are, not appear.
They need to be bright,
and show they have fight,
and be someone you'd like to have near.

† Confucius

Build Better. Together.

FLOOD PASSAGE AT DAMS – PMPs AND PMFs

What are the PMP and PMF?

PMP – Probable Maximum Precipitation

- The greatest rainfall considered to be reasonably possible to occur at a given location, over a given area, for a given duration

PMF – Probable Maximum Flood

- The flood that is caused by a PMP rainfall

Need to know...

These are terms common to the dam engineering community and can control much of the cost of both new dams and spillway upgrades.

For dams where loss of life could occur as a result of their failure, the PMP and PMF are often used to establish the size and operating limits of the spillway(s). Specific design flood requirements vary among states and federal agencies, with specific requirements available from each dam safety program. Use of PMP and PMF values will set the size and operating limits of the spillway in question. Because each state has its own laws and guidelines, it is important to note that specific requirements are available from each state's dam safety program.

Timeline prepared by Dr. David F. Kibler and Michael Bliss, Virginia Polytechnic University, 2005 http://www.schnabel-eng.com/Resources/WaterWire7.aspx


OLEAN TIMES-HERALD, THURSDAY, JULY 23, 1942

Flood Moves Storage Tank

In 1942, rainfall in Smethport, Pennsylvania was estimated to be nearly 31 inches in less than 5 hours. This estimate exceeds the hypothetical PMP. The flood waters picked up and moved this water tank well downstream.

How did these values get established?

Over the past century, the hydrologic sciences have evolved from estimates based on the largest flood stage of memory to more analytical approaches that connect runoff to rainfall, soil conditions, stream slope, roughness and other characteristics, basin size and shape, and other influencing factors.

PMP DEVELOPMENT TIMELINE

- **1900** – Pre-1900: No consistent data from U.S. Weather Bureau - used 'worst known flood'
- **1910-1940** – 1910-1940: Hydrology methods begin to emerge
- **1930** – By 1930: Formal statistical methods are applied to hydrologic problems
- 1942: C.S. Jarvis develops Myers' envelope curve equation
- **1920-1950** – 1920-1950: Flood prediction linked to storm precipitation
- **1950** – 1950: Creager and Justin develop 'Creager' envelope curve equation
- **1953** – 1953: Yarnell publishes rainfall intensity charts for U.S.
- **1961** – 1961: Tech. Paper 40 links storm recurrence to depth of precipitation
- 1978: HMR 51, 52 is published; PMP east of 105th Meridian
- **1970-2000** – 1970s-Present: PMP is formalized and becomes standard of practice

Current extreme rainfall values were based upon a combination of atmospheric physics that define maximum moisture content and precipitation rates for cyclonic, frontal storm and thunderstorm events, together with the inclusion of significant historical extreme rainfall events used for validation.

Are storms of this magnitude realistic?

While extreme rainfalls and the floods they generate are by definition rare, especially when considered relative to a single location, rainfalls approaching probable maximum values can and do occur. One such flood (Smethport, PA, 1942) classified as a world record storm for its drainage area.

Examples of extreme rainfalls in the U.S. (averaged)

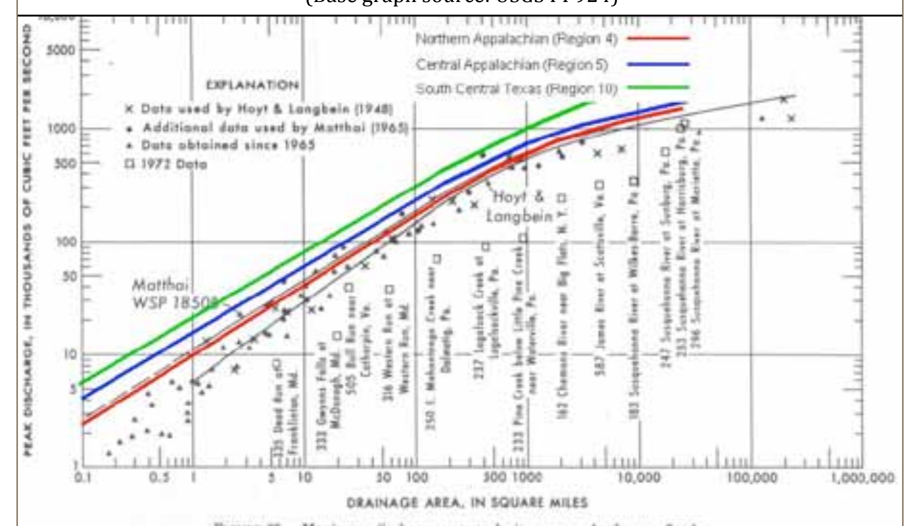
SITE	RAINFALL	DURATION	HOURLY RATE
Haynes Camp, CA	2.5 inches	5 minutes (0.08 hrs)	30 inches/hr
Holt, MO	12 inches	42 minutes (0.7 hrs)	17 inches/hr
D'Hanis, TX	22 inches	165 minutes (2.75 hrs)	8.0 inches/hr
Smethport, PA	30.8 inches	270 minutes (4.5 hrs)	6.8 inches/hr

For more detailed backgroun info, see: (PMPs Never Happen - Or Do They?)
http://www.schnabel-eng.com/Resources/WaterWire7.aspx

Can a reasonable estimate of the PMF be developed without detailed analysis?

Similar to development of extreme rainfall values, various authors have investigated maximum discharges that could be anticipated for streams in various regions. Crippen and Bue (1977) developed envelope curves for 17 hydrologically-similar regions in the United States. Other authors have used maximum observed discharges to extrapolate to other drainage basins. Schnabel personnel have combined maximum observed discharges with PMF estimates for drainage basins in the Northern and Central Appalachian Regions to produce the following PMF Estimate Curves.

Figure 9: Approximate PMF vs Drainage Area for Evaluated Regions
(Base graph source: USGS PP924)



Basin shape, geology, slopes, land cover, and other factors have an influence on a computed PMF. These factors should be considered when estimating whether a particular basin's PMF would be higher or lower than the values produced by the above graph.

For Ball Park PMFs, see: **http://www.schnabel-eng.com/Resources/WaterWire7.aspx**

Why such a large rainfall? What's the risk?

A dam failure can be a lot like a plane crash - sudden, unanticipated and potentially devastating. Would we be happy with a one in a hundred thousand annual chance of a US commercial plane crash (hint: one in a hundred thousand translates to about 120 commercial aircraft crashes per year)? Similar logic is at work in establishing acceptable performance standards for dams. Dams judged to present a high hazard potential are those where a failure would likely result in loss of human life and extensive property damage. These dams typically need to safely pass from ½ of a PMF to a full PMF depending on state regulations.

Because dam safety is regulated at the state level, there is more variance in the application of dam design standards and, therefore, more variability in risk sensitivity. Also relative probabilities of PMPs vary for different areas of the country. For areas along the Pacific Coast of the US, the 100-year rainfall corresponds to about 25 to 50 percent of the PMP. In Ohio, the 100-year rainfall is generally about 15% of the PMP (Ohio is not located close to an ocean and doesn't have mountains to stall weather patterns) indicating that the probability of a PMP varies with geography.

Rainfall from storms in Georgia in September 2009 was estimated to exceed 50 percent of the PMP, causing activation of auxiliary spillways like these at Snake Creek Dam.

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