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Puerto Rico Water Resources and Environmental Research Institute ...
Dedicated to the Research and Sustainable Development of Water Resources in Puerto Rico

El Niño - Goes to the University

The United Nations University (UNU-Tokyo) is motivating a multinational and multidisciplinary study of "El Niño Impacts and Response Strategies in Pacific Rim Countries." A plan of action, which will focus on the assessment on the interest in information about forecasts, impacts, responses, and policies related to El Niño will be developed.

Forecasters, assessors in impact and different region decision makers will be involved in this phase. The object of the project is to improve the understanding of El Niño's behavior which has caused droughts, floods, frosts, fires, famines, and changes in typhoon tracks.

The developer of this project is Michael Glantz. For more information you may write to: **The National Center for Atmospheric Research, PO Box 3000, Boulder, CO 80307; (303)497-8119; fax: (303) 497-8125; e**-mail: glantz @ucar.edu.

From Natural Hazards Observer. Article titled: The UNU El Niño Impacts Program. Volume XXII Number 6. July 1998. p. 16

Computers, Water, and the Year 2000

You probably have heard that in January, 1, 2000, you could be in deep trouble. This situation has been known as "the Y2K problem."

The problem is that there will be an inabily of most computers to advance smoothly from the year 1999 to the year 2000. Because computer codes only read the last two digits in the year 00. The possible consequences of such a simple but harmful computer bug should put all water utilities on standby alert beginning right now.

How should water utilities prepare for the year 2000 computer problem? Rick Cowles, a consultant who specializes in the Y2K dilemma, recommends five business areas and systems that every utility should consider mission-critical.

1. Human Resources: Make sure to secure your human resources rights and benefits such as payrolls, pension, job posting, and other systems. Human resources must be your number one priority.

2. Financial Control: The US Securities Exchange Commission, Moody's, Barron's and a host of other financial risks organizations will want to know whether your FI systems are Y2K-complaint. Can you pay your bills? Can you process your receivables? Can you budget? And most important, have you tested?

3. Plant Maintenance: Can the systems track and schedule preventive maintenance and surveillance testing into the future? Will your work order system and HR systems work in tandem to schedule resources for maintenance?

4. Purchasing: Can you interact with your suppliers? There are a lot of systems and interrelationships to check here. Also, have

you included Y2K compliance clauses in all of your current purchasing documents?

5. Inventory Control and Warehousing: Make sure suppliers are Y2K-ready and if necessary, identify alternate sources for mission-critical materials.

Remember that modern water utilities need electricity and also are computer generated. How does your utility deals with electric power outages? What are the contingency plans in your utility experiences random daily power interruptions for a week? Two weeks? For a month? Consider these questions:

- What kind of fuel runs your generator?
- How much fuel do you store onsite?
- Should you expand your fuel storage facilities?
- Should you add more generators?

Remember that if you are aware of the possible complications when the year 2000 arrives, you should be doing all the necessary adjustments now that there is still time.

From: Opflow Vol.24 No 7.
Article titled: Year 2000 Could Create Trouble for Utilities

Municipal Wastewater and Oil Refineries

Major industrial plants have been put under pressure in California for the use of municipal wastewater. Oil refining in particular was put under pressure because it is a major industry in California with 25 refineries, where cooling tower make-up in refinery cooling systems can present unique challenges due to the inferior quality of the water. In the following it will be presented a four stage approach for water resource management in an industrial plant.

Stage 1: Plant Audit. System, and water quality characterization.

Stage 2: Recycle System Design and Evaluation: Includes preliminary design calculations, and laboratory testing to determine experimental feasibility.

Stage 3: Pilot Testing: Verifying and estimating the results in stage 2.

Stage 4: Implementation: Transition from well water to municipal wastewater.

The transition to municipal wastewater is preceded by the following stages:

- Careful analysis of the water chemistry specially for identification of contaminants.
- Consideration of approaches when finding contaminants using computers as a tool.
- Pilot evaluation to optimize the cooling water treatment program, determine expected corrosion, scaling and microbiological performance and to develop solutions to safely manage risks of using municipal wastewater.
- Implementation and further optimization

Several novel on-line monitoring and control tools are available to help manage risks associated with using municipal wastewater while enhancing tower operation. The use of corraters, C-factor, U-factor, bio-fouling and deposit monitors are some examples of on-line performance monitoring. A high level of system automation enhances reliable system operation.

From D&WR
August/September 1998. Vol. 8/2 p.20
Article Titled: Use of a Systematic Approach in Planning, for Reuse of Reclaimed Municipal Wastewater in Oil Refineries

Best Management Practices to Protect Groundwater Systems

The US Environmental Protection Agency (USEPA) is required by the Safe Drinking Water Act to develop a national primary drinking water regulation requiring disinfection, as necessary, as a treatment technique for all public water systems served by groundwater. The agency is in the process of developing a Ground Water Rule (GWR) for proposal by March 1999 and promulgation by November 2000.

In general, sanitary engineering and management practices have been applied by groundwater systems for many years to protect against waterborne disease. State regulatory agencies require application of best management practices (BMPS) to differing degrees.
USEPA has decided to build on successful state requirements and practices in developing the GWR. The BMP approach involves giving attention to all aspects of the public water system-including well construction, operation, and maintenance rather than relying on treatment alone.

In 1995 and 1996, all 50 state drinking water programs provided the agency with state statutes, regulations, and guidance relating to the construction and operation of public groundwater systems. Using these data, USEPA categorized requirements according to disinfection practices, well-siting and construction specifications, and distribution system protection practices. The existence of a wellhead protection program, the requirement of a sanitary survey, operator certification, and microbial monitoring at the wellhead were addressed. The agency prepared summaries of each state's requirements, which were then checked by the state agencies.

USEPA released a discussion of results of this survey in the GWR stakeholder meeting in June 1998. Disinfection re-

quirements varied significantly from state to state. Some require disinfection; others emphasize prevention using BMPS, requiring disinfection only on a case-by-case basis.

Nationally, 55 percent of the community water systems, 28 percent of the noncommunity water systems, and 17 percent of the transient-noncommunity water systems practiced disinfection. Disinfection is required for all systems by 13 states, with requirements in two states based on the year the water system was constructed. Thirty-six states establish specific disinfection requirements on a case-by-case basis.
Forty-eight states require that water systems be constructed according to state well-construction codes, and in all but one state this requirement is mandatory for all public water supplies. Forty-seven states have minimum setback distances in their well codes to prevent contamination by microorganisms.

The public health protection efficacy of BMPs was empirically evaluated in a study by the Association of State Drinking Water Administrators (ASDWA). In general, this evaluation found that more large systems implement BMPs than small systems. The percentage of systems implementing BMPs was highest among those with no total coliform detections. BMPs of the greatest significance differed according to the size of the population served by the system.

Application of the various BMPs are highly interrelated. In general, differentiating the effect of an individual BMP from the effects of other practices is difficult. Simply requiring a particular practice to be applied does not ensure that it will be applied properly, nor will every practice be applicable for every system. Incorporation of BMPs into a regulatory scheme for the GWR requires flexibility so that state regulators, operators, and consultants can exercise the necessary professional judgment to determine which BMPs are needed for a particular system and to ensure that they are applied properly in each specific circumstance.

From: Journal of American Water Works Asociation Vol. 90, Number 8, 1998. p.18-19.

Winning the War Against Microbes

Controlling microorganisms has been cornerstore of drinking water treatment in the twentieth century. Although water suppliers pride themselves on having virtually conquered waterborne disease, occasional outbreaks of cryptosporidiosis, giardiasis, and even Legionnaires' disease remind us that microbes-minute but mighty-deserve constant attention in raw water supplies, treatment plants, and distribution systems.

In a review of 35 cryptosporidiosis outbreaks in North America and the United Kingdom, it was reported that this disease occurs in urban and rural areas worldwide. Outbreaks associated with drinking water have been attributed to filtered and unfiltered surface water sources, groundwater sources, and contaminated distribution systems. Despite the prevalence *of Cryptosporidium parvurn* oocysts in source water, the authors do not support establishing an action level for oocysts in drinking water. Instead, they recommend continuing to prevent waterborne transmission by multiple barriers.

In a surface water source, rainfall increases raw water concentrations of these protozoa primarily by affecting turbidity. Surface water systems should have adequate storage capacity to minimize the effects of rain-induced turbidity spikes by not drawing water during or immediately after rainfall.

Optimizing treatment practices is crucial to the multiple-barrier approach to protecting public health, and alternative treatment techniques are also being explored. Because oocysts resist conventional chlorine-based disinfectants, several electrotechnologies are considered as inactivation methods. Pulsed and advanced ultraviolet (UV) light devices can inactivate *C. parvum* oocysts in water. The cost of this electrotechnology may be comparable to that of conventional disinfection methods.

UV light is also used to control *Legionella pneumophila*, a bacterium that colonizes hot water distribution pipes and fittings. other control measures include copper-silver ionization, superheat-and-flush procedures, instantaneous heating systems, and hyperchlorination.

Legionnaires' disease is particularly threatening to patients in hospitals and nursing homes. States et al studied *Legionella* contamination in the hot water systems of four nursing homes. Contamination may be associated with lower hot water temperatures, lower chlorine concentrations, more free-living amoebae, and intermittent seeding of building plumbing systems by legionellae from public water supplies.

Researchers are also evaluating new applications of membrane technology for pathogen removal. Reverse osmosis (RO) has the potential to remove pathogens of all sizes, including viruses. However, more stringent quality control measures during membrane manufacture if RO is to be used for pathogen removal.

Despite recent additions to the drinking water profession's arsenal against waterborne disease, the multiple-barrier approach is still its most effective weapon. The war against waterborne pathogens must be fought on every front.-NZ

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