

## Look Out Window!!!

By Jeff Swanson, Circuit Rider

Sometimes I wonder if I really couldn't live without this thing sitting on my lap right now – my laptop computer. After all, it's helping me write this article! Or, am I helping IT write the article? Remember the old fashioned 'typewriters'? I would dread having to spend time backspacing, moving the carriage back, and oh yea; the dreaded white-out. Sure I curse my computer once in awhile. Does it help? Yes, but only briefly. Then it seems to freeze up even more! The best part you might ask – the "OFF" button. I have learned that all the cursing in the world at an inanimate object just doesn't have the same satisfaction as a little bit of pressure that the index finger on the "OFF" button can have. Yea baby – take that! But seriously, I would not be able to perform my job duties without a computer. Nor would any of us be able to operate (driving the bus!) our water or wastewater plants. Of course, some of the older and/or smaller plants do not have the computerized SCADA (Supervisory Control and Data Acquisition) systems. These computerized systems are making their way into the 'techno world' at such a rapid rate; it's hard to keep up. It is also hard to deny their need due to the increasing monitoring requirements and new regulations. Whether or not you have computers in your life today, it will be difficult to continue into the future without some kind of help from the computer world. Let's explore some aspects of computers and what they can do for us....or NOT do for us!

**High tech stuff:** When I operated an Ultra Pure Water Plant (UPW) at a Semi-Conductor Facility, the first thing the boss said was, "are you afraid of the little mouse?" as he held up the computer mouse swinging it through the air. The fact was, the entire 2-story facility was dependant on an Allan Bradley PLC-5 and Wonderware operated computer system. Sometimes I felt that the computer was operating me rather than the reverse. It would talk to you, by voice and audible alarms. It would direct you to the equipment that was having an upset. But it wouldn't always tell you what the problem was. That was up to the operator. One of the things I learned to do was rely on my senses. Sure there are temperature gauges, flow meters, level indicators, pressure indicators and so on. When only a few

minutes remain during an alarm, an operator would have to react immediately to prevent a potential plant upset or crash. (*Did I mention that a mere 1 hour of down time at this facility would cost the semi-conductor facility a measly \$100,000.00 per hour? What do you suppose it would cost the operator?)* Using ones' sight, gauges and other analytical devices are periodically read. (*A recently visited system operator showed me a simple visual test that he performs continuously. It consists of a white bucket being filled with treated water and a coin at the bottom. If he can read the print on the coin – the water is clean*). His visual perception agrees with the analytical results. Using your hearing, you could hear cavitations, noisy bearings, pneumatic leaks, and abnormal water flows. Using your sense of smell, you could detect overheated pumps, chemical spills or leaks, and sometimes electrical damage. Using your sense of touch, you could detect temperature changes and vibrations on pumps, piping, and valves. And finally, with an 'ultra' sense of urgency, you could then make the necessary adjustments on the computer or device and bring the plant or device back into a normal operational state.

My first impression at this facility was that the computer basically "ran" the plant. Boy was I wrong. It turned out that I had to learn the facility and its idiosyncrasies and develop a close working relationship with the computer. Did I say relationship? Oh yea! Computers just like people have limits. The ability to know the limitations allowed me to more effectively operate the highly technical system by learning those limitations and react accordingly. After all, I didn't want this plant to be "down" for 1-minute.

By using the ability to reason and troubleshoot, I was immensely dependant on using my senses. The computer couldn't perform those duties even with its "mega" and "giga" capabilities. I am sure this plant was not as complex as the space shuttle, but why do you suppose we have astronauts?

In this facility, I was also responsible for the PM (Preventative Maintenance) schedule. This was truly a wonderful application for the computer. With over 200 analytical devices and electronically and pneumatically controlled pieces of equipment, an extremely disciplined maintenance program is necessary. Equipment maintenance was performed

daily, weekly, monthly and annually. For each device, a maintenance schedule was devised with the aid of a software program. It began with a somewhat ominous amount of data entry for each and every device. Once accomplished, the program would automatically dispense the necessary work orders at 2:00 a.m. every day. Promptly at 6:00 a.m. each morning, the 2:00 a.m. work orders were distributed to the operators. Each would contain the name of the equipment, the maintenance to be performed, (oil changes, calibrations, adjustments, etc.), the types of tools necessary for the job, the proper procedures, and the required safety gear. When an operator requested more information about the equipment, the computer program would provide additional information such as suppliers, contact names, phone numbers, and a detailed list of parts and materials right down to the size and thread type of a simple screw or nut. Of course, an operator had to initially enter the data. When the data was entered, the act of performing preventative maintenance was direct, prompt, and *always* on time. Could you use this type of program for a small water/wastewater system? Computers are tools that can help. It merely takes the hand of the master to utilize the tool in the manner that yields the desired results.

**Computer Modeling:** Computer modeling has become an effective method for simulating that which cannot always be accomplished in a physical sense. Remember the kind of models we had before computers? Model planes, cars, trains, and space ships were popular ways to visualize the larger useable prototypes prior to inception of the actual drivable and flyable ones. How many skyscrapers, shopping centers, and amusement parks were based on a small table-top model? Epcot Center and Disneyland were models built on a series of movable tables that were made to 'fit'. Now we enjoy the benefits of those simple models. The ability to 'marry' the physical and computer enhanced models is truly a marriage of the practical and high-tech minds. Can you think of a physical model used in both surface and groundwater systems? Jar testing has been used for years to take a bench tested scenario that represents the larger physical plant. Should the results be undesirable; the jars can simply be emptied into the sink, and a new test can be re-attempted. Should we rely on 'first-time' results in the water plant; results could be catastrophic. It's hard to take back that one-

million gallons after the improperly treated water enters the distribution system.

Next on the agenda, we were to un-harness the boundaries of the physical models. Airline pilots would first sit in a flight simulator prior to sitting at the control of a 747. Computer models made the pilot able to experience the act of flying without crashing an actual airplane upon re-entry during a bumpy landing. I suppose today, flight models may also include how to react to a hijacking. Other such visualization tools include Auto-Cad that enables engineers to envision future construction of applicable infrastructures in our communities. There is no end to the types of modeling. They range from microscopic to cosmic. Some are used in architecture, museums, medicine, economic projections, and even development of some of the rules and regulations extended to us from the USEPA (United States Environmental Protection Agency). The CDC (Center for Disease Control) provides data for the interpretation by various agencies when helping to determine the effectiveness of meeting specific "goals" to aid in the prevention of health related risks in our water systems. When people do not understand science and mathematics well enough to understand the impact on public policy, the ability to fully evaluate the statistical evidence can be aided by viewing simulations and models and the trends that only the computers that created them can unravel. Computers are able to perform these commands in short periods of time. The commands are based on data entry by humans, are extrapolated by the computer and interpreted by humans.

By now you probably wonder what reason I had for writing such an article. Well, I'll tell you why. When I was a young lad living on a ranch, I had a horse, a bicycle, a fishing pole, and a BB gun. Even as I grew older and entered college, the thought of using a computer was at best; something I thought would never happen; even when the early DOS system was being introduced. Hand-held calculators were selling for over \$125.00. The same ones are now sold for \$3.00. To completely understand the necessity of learning computer operation came to me when I began work at the UPW Plant. Quite simply; I couldn't have done it without a steep learning curve and computer savvy.

So what's in the title of the article? Being in the water treatment industry and working with a natural resource, I have always been intrigued by the weather. So here I was working in Portland one day where the weather forecast called for a chance of rain showers and temperatures between 48F – 52F. This was mentioned in the forecast all day long. At about 4:00 p.m. when heading home for the day, I sat on Hwy 26 in bumper to bumper traffic. As I sat there on the freeway in a blinding snow storm on 3 inches of packed snow, the DJ on the radio once again mentioned the forecast, “a chance of rain showers and temperatures should be between 48F – 52F.” Could their computer be wrong about this one? – or should I have called them and said, “Look out Window?” Whatever the case may be, computers are useful tools. Tools were invented by man and meant to enhance our daily lives. I hope we USE them! When it comes down to Virtual Reality; you'll find me down by the river with fishing pole in hand, wearing a pair of cheap sunglasses. Come on down! FISH ON!