SPRINKLER AUDITS YIELD WATER SAVINGS, FINANCIAL OPPORTUNITIES

▲ **Doing the math** at an irrigation audit workshop at the STMA Regional meeting in Cincinnati in 2012.

"AUDIT" IS NOT A WORD THAT BRINGS ABOUT POSITIVE FEELINGS of personal harmony or financial well-being. A mere mention of the word can evoke a physiological response: sweating palms; involuntary twitches; a creamy gray pallor.

An irrigation audit, however, is like any other internal examination. It reveals performance strengths, structural weaknesses and procedural opportunities. Moreover, an irrigation audit can provide field managers and grounds superintendents statistical data for building a blueprint to improved turf conditions, reduced expenses, and the turf industry Holy Grail—water conservation.

There's no better evidence for budget requests to upgrade a facility than a cost-benefit report to your board, council, commission or CEO. An effective irrigation audit delivers sound projections for annual savings in water, power, personnel, maintenance, turf and equipment replacement, and more. Connect that with a dollar amount, and you're in business.

Irrigation audits generate concrete information for the boardroom, but as importantly, for your frontline maintenance crews. They're the day-to-day managers with eyes on the ground. Your technicians are key to handling acute problems, like lateral breaks, broken heads or plugged nozzles, while alerting you to more chronic conditions that begin to

appear over time, like inadequate pressure or loosening packing in your pump station.

DATA HOARDING AND DOCUMENTATION

An irrigation audit can be simple or exhausting. You can evaluate individual zones for distribution uniformity, assess specific areas in your facility for trouble spots or appraise the entire system top to bottom.

Irrigation consultant Brian Vinchesi advises identifying a specific goal or goals before commencing an irrigation audit. "It's good to know what you're hoping to accomplish with your system before you get started," he says. "Are you considering adding a new water source? Are you facing new watering restrictions on how much water you can use or the hours you can use it? Are you adding zones or fields? Are you looking for significant water savings?"

"There are numerous considerations," adds Vinchesi, president of Irrigation Consulting, Inc., in Pepperell, MA. "Sites change over time. More entities tap into your water source, which can affect available pressure and water quality. Fields might be added or eliminated. Safety concerns in sports turf facilities have changed over time. It's all part of the mix and should be evaluated and documented."

You have to be in the field to know your how well your program is performing. However, desk duties are part of the game. In the office, gather previous years' water reports, architectural blueprints, irrigation design plans, as-built drawings, water scheduling programs, water quality reports and other useful data used to manage water and other resources. And, before you step onto the field, Vinchesi strongly recommends adding a camera to your toolbox.

With your history and documentation secured, it's time to get outside, look things over and take down some notes and numbers. "Beyond equipment issues, which must be recorded, your best opportunities to improve water use are with management, like irrigation scheduling and uniformity," points out American Society of Irrigation Consultants President Ivy Munion, with ISC Group, Inc., in Livermore, CA. Look at your facility as a whole. Document turf wear, hot spots, soupy areas, compaction, drainage and the like.

Ideally, your system is performing at the designed volume, flow and pressure. Your original irrigation plans will provide those numbers. Take a pressure reading at the water source. Inspect your cross-connections, master valve(s), flow sensors, pump station(s) and smart technology, looking and listening for smooth, proper cycling and operation. Check your metering devices, looking for the spinning leak dial. "In a multiple field complex, you need to really observe how everything interacts," Vinchesi

Simple sprinkler audit inspection checklist

- Check the coverage of full- and part-circle heads, ensuring that the sprinkler is adjusted to cover only the portion of the facility it is intended to.
- Check the radius of throw and ensure that the head is rotating completely.
  Check disbursement at each nozzle, ensuring that the orifice is not clogged, obstructed or excessively worn. Replace nozzles that appear worn, as they may alter flow rates, precipitation rates and coverage.
- Use a pitot tube to check nozzle-discharge pressure. Log all data for future reference. If several heads in a zone become weak or inoperative, there may be debris in the valve or a breach in the piping.
- Inspect the sprinkler housing for damage or debris.
- Check your low sprinkler heads for drainage.

◀ **Bob Campbell, CSFM,** and former president of the STMA, works with an attendee during the hands-on irrigation workshop on a Cincinnati Bengals practice field.

asserts. "Record your start times and run times zone by zone, and how they all fit into your scheduling window. You might discover your system can't handle your scheduling demands."

Grab your foreman and inspect your control system and satellites; ensure connections are tight and your scheduling is on track and adjusted for the season. Record the number of field controllers, active zones on each controller, programmed runtimes for each zone, number of heads on each zone. Keep those records handy for your sprinkler inspections, where you can record head make and model, nozzle size, radius and distance of throw, and pressure at the head (using a pitot tube).

While Vinchesi likes to start an audit as is, without first tweaking the system, Munion wants the simple stuff rectified. "Broken or misaligned heads, rotors mixed with spray heads on the same zone, worn or clogged nozzles [are examples of] fundamental equipment transgressions [that] should be resolved before we start running catch-can tests," she says. "Field changes over the years are horrible. We see more duct tape, pipe glue and bailing wire than we care to. Those things should absolutely be resolved in this process."

Once the basics are in line, develop a punch list of items to inspect. Go to your valve boxes and ensure they're off the field, accessible, buried to grade and well-drained. Clean them out and check the wiring to ensure connections are solid and dry. Look for leaking or weeping valves. Keep a log of everything you observe, good or bad.

GET INSIDE YOUR HEADS

The root byproduct of poor irrigation uniformity is overwatering. Runtimes are developed based on the weakest coverage area. We irrigate for the dry spot, regardless of what pours over the remaining landscape area. "Really consider how your system is zoned," Vinchesi says. "Older systems might have been designed for sprinklers to just run across the field, but by zoning goal areas or infields you have greater control over turf wear and resilience without just pouring more water over the site. Fundamentally, irrigation is about control."

The goal of a simple audit is to improve sprinkler distribution uniformity and zero in on accurate scheduling. It's time to operate the system; checking each valve and head in each zone. Ensure that heads and nozzles match, and that each head is perpendicular to - and to grade with - the surface. These are important performance and safety issues. Check nozzles for obstructions or wear, and replace with the specified nozzle size. Replace heads that don't match design or operating specifications.

Check the pressure and rate of water discharged from your heads. Ensure that the operating pressure at the head is consistent with the manufacturer's specifications. Too much pressure creates poor uniformity, wind drift and accelerated evaporation. Too little pressure affects radial sprinkler uniformity. While your there, measure the distance between heads. Your system should provide head-to-head coverage.

CAPTURING PRECIP RATES AND DU

Catch-can tests quickly reveal distribution uniformity (DU), or how evenly water is being applied to your fields, while measuring your precipitation rate in inches per hour. Locate your trouble spots, like infields, goal areas and/or the center of the field, and stake out

your catch cans in a uniform grid in multiples of four (28 catch cans, 40 catch cans, etc.) within that area.

By necessity, irrigators water to the driest areas, so you're assessing your lower-quarter distribution uniformity, or the poorest performing 25 percent of sprinkler coverage for the affected area. Run every zone that covers the affected area for 15, 20 or 30 minutes – enough time to register measurable amounts in the catch-cans that are convertible to inches or milliliters per hour. This reveals your problem heads/zones and your per-hour precipitation rate – data necessary for comparing what your site gets to what it needs (based on turf type, soil profile, drainage, evapotranspiration rates, sustained winds, sun exposure, etc.).

Whether you've conducted an all-inclusive, system-wide audit, or catch-can tested select areas within the park, you've gathered important data, and now it's time to put it to work. Provided your water volume, flow and pressure(s) are still at design levels, triage your repairs, plan any sprinkler head relocations, build you inventory and adjust scheduling accordingly. Get your crews out and start effecting the simple improvements, focusing on safety and equipment integrity, while planning larger projects that require significant budgets and disruption, like pump station issues or pipe sizing challenges.

Organize a regular irrigation system inspection program. Determine which parts to keep in stock for quick repairs, including all sizes of pipe and fittings; electric valves; wire and connectors; swing joints and risers; and sprinkler heads and nozzles. Ensure that the spare parts are of the same make and model as those in the field. Product integrity plays a big role in efficiency.

Most field managers have inherited their systems with all their scabs and warts. Performing a system audit can put you in a position to truly improve your playing surface through a surgical approach, rather than constantly putting bandages on a tumor.

Vinchesi suggests enrolling in Irrigation Association certified landscape or golf irrigation auditor programs. "These courses, scheduled throughout the year across the country, are worth your time," he says. "They provide important standardized tools and procedures, and sources for valuable localized data needed to generate accurate irrigation schedules."

A proper irrigation audit documents core system problems and provides effective, triaged solutions as a blueprint for progress – with associated payback. Put your problems and solutions on the table and watch others wipe their sweaty palms and suppress their nervous ticks. ■

Luke Frank is a veteran green industry writer with extensive experience with irrigation topics.