A Review of IA's New Landscape Auditing Guidelines
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History

In May 2009, the Irrigation Association (IA) released an update of their Auditing Guidelines. The IA originally developed the guidelines "in order to establish uniform, consistent practices" and serve as recommendations in the auditing of landscape irrigation systems. They are not applicable to agricultural auditing (ASABE Standards apply) but are helpful in golf auditing as most of the same concepts apply. A committee of irrigation contractors, consultants and sales personnel with auditing experience began the development of the original auditing guidelines in 2005 and worked on them over a three-year period. In late 2005, there was an open public comment period. In April 2007 the peer reviewed guidelines were first released as "a set of minimum guidelines to provide some degree of standardization of irrigation (auditing) procedures in the irrigation industry." Due to criticism over the last several years that many audits were not repeatable for the same site by different auditors, the guidelines were updated to reflect current best management practices, new research and ASABE standards were incorporated where possible. The revised guidelines were also reviewed by the IA Certification Board.

In September 2009, the guidelines were slightly modified again to reflect the Irrigation Associations decision to report Distribution Uniformity as a decimal as opposed to a percentage.

Basis

Mainstream irrigation audits (Figure 1.) began in the early 80's with the development of the auditing program at Cal Poly San Luis Obispo funded by a grant from the California Department of Water Resources. The passing of AB325 in California required that landscape irrigation systems be audited and as such a large number of individuals attended audit classes and became certified. Experience was not a prerequisite to being certified, although the class was (no longer the case) and still today there are many certified auditors with minimal irrigation or auditing experience. Making a living as an auditor 20 years later has still not come to fruition. Today auditing is once again becoming mainstream, as various regulatory authorities, including the EPA's WaterSense for New Homes Certification program, are requiring audits of new irrigation systems before homeowner occupancy. By following the guidelines, audits on the same irrigation zone should be repeatable and consistent, even if being preformed by different auditors at different times.

Figure 1.

Process

Before performing the audit, the irrigation system should be in optimal working order, which may require identifying operational defects and deficiencies. In a pure audit the auditor should also make sure that the system complies with local codes such as backflow prevention devices and water meters or rain shutoffs if required by code or law. However, depending on the purpose of the audit, sometimes the audit should be performed on the system as is. For example, if a system needs to have documented how bad it is operating then you would take the system as you find it.

The auditing procedure is a systematic process. An experienced auditor over time can develop efficiencies in the process that make the audits go faster and therefore make them more economical. Some important auditing points:

1. Maximum allowable wind during an audit should not exceed 5 mph. Wind speed should be monitored and recorded every 5 minutes during the testing portion of the audit.
2. The audit should be performed under normal operating conditions, which may be at night when the system usually operates. If it is not performed under normal conditions, a note should be made and assessment of the impact of not being under normal conditions during the test provided.
3. Pressure testing should be done at the beginning and end of each zone audited while the sprinklers are operating (Figure 2.). A static pressure (without sprinklers operating) can also provide useful information.
4. Large catch devices (cups) give better repeatable results (Figure 3.).

Figure 2.

Figure 3.

5. Location of catchments should be documented. This helps with repeatability.
6. A minimum of 24 catch devices should be used. Smaller sprinkler spacings (less than 15 feet) may require even more catch devices to provide statistical accuracy.
7. Catch devices should be placed 12 to 24 inches from edges.
8. When testing multiple stations, test run times must be adjusted to ensure match precipitation across the test area (i.e. part circles versus full circle zones)
9. Stations can be "linked". By linking, the auditor elects to test one third to one half of the zones to get an average value that can then be applied to other zones that are identical in terms of sprinkler type, nozzling, pressure and spacing.

Test Runtimes

Test runtimes should be based on a minimum volume of water needing to be captured. The volume should be approximately one and one half times the throat area of the catch device. Table 1 shows the minimum amount of water that would be caught for various size catch devices.

Table 1. Minimum Catch Volume Required for Various Sized Catchments

Dimensions	Area	Volume
4" x 5.4"	21.6 square inches	32 ml
4.58" diameter (Cal Poly)	16.5 square inches	25 ml
5.6" x 5.6"	31.36 square inches	47 ml
8.5" x 11.5"	97.75 square inches	147 ml

This will also roughly translate into 5-minutes of run time for sprays and five full rotations for rotary sprinklers. With experience, test times for various sprinkler types, spacings and catch device types become evident.

Catch Device Placement

Along with the number of catch devices, where they are placed is key to having an accurate audit with repeatable results. The placement of the catch devices is dependent on the sprinkler type and spacing as well as what type landscape (i.e. shrubs, small lawn, large lawn, athletic field, green, tee, fairway) is being audited. The auditing guidelines as well as the IA Landscape Irrigation Auditor and Golf Irrigation Auditor Manuals provide specific criteria for placing catch devices based on the sprinkler type and spacings and/or area being irrigated.

- Spray Sprinklers – near a sprinkler and halfway between sprinklers
- Rotors (< 40 foot spacing) – near a sprinkler and every one third distance between sprinklers
- Rotors (>40 foot spacing) – near a sprinkler and one fourth distance between sprinklers

- Irregular shaped areas – a 5 to 8 foot grid spacing for sprays and a 10 to 20 foot grid spacing for rotors

- Athletic Fields – same as >40 or a 20 to 25 foot grid spacing

- Greens, tees, fairways – use a grid spacing, size will vary with the feature and its size (more catch devices needed on a green than on a fairway) (Figure 4.).

Figure 4.

Data

For the audit to be complete and be able to perform the required calculations (Lower Quarter Distribution Uniformity and Net Precipitation Rate) all of the following data needs to be collected for each zone audited:

Sprinkler locations
Sprinkler spacing
Sprinkler type including make, model and nozzle
Catch device locations
Catch device throat area
Catchment readings in ml
Test run time
Wind speed-readings
Soil type
Root zone depth
Pressure readings and location
Test date and time
Water meter or flow meter readings if available
Controller type including make, model and features

Since its development, Distribution Uniformity has been presented as a decimal, perfect uniformity being 100%. However, even rainfall is not 100% uniform and for irrigation systems 80% is considered excellent. The problem is that the general public and regulators look at how much lower than 100% irrigation systems are testing and assume that there is huge room for improvement, i.e. much closer to 100%. In order to deter this perfect uniformity concept, the Irrigation Association has decided to calculate and report Distribution Uniformity as a decimal with not comparison to percentage. This is a minor change as Distribution Uniformity has always been calculated as a decimal and converted to a percentage by multiplying by 100. Therefore 0.80 would be considered excellent

uniformity with 0.70 being acceptable, etc. This change is not only reflected in the auditing guidelines, but also the IA teaching manuals and class instruction.

Following the proper auditing process will result in an accurate determination of the two measured parameters of an audit: distribution uniformity and net precipitation rate. The results should be repeatable under the same circumstances. Auditing lends credibility to the profession and reduces water use by better scheduling. It is also a lot of fun but you usually get wet, which might not be fun.

The IA provides their auditing guideline “without warranty of obligation”.