What's New for Non-Potable Water in the IPC?
Based on the 2015 International Plumbing Code

Description
- Include a few sentences to describe this learning.
  - One sentence course goal
  - A few statements reflecting the highlights of the course.
  - One sentence for what the participants can expect.

Objectives
- Upon completion, participants will be better able to:
  - Write at least one objective for every hour of training.
  - Develop objectives with action verbs that are measurable and quantifiable.
  - Determine activities for each of the objectives while writing the objectives.
  - Describe what you want people to be able to DO after leaving the training.

Accreditation
- The International Code Council has been accredited as an Authorized Provider by the International Association for Continuing Education and Training (IACET).
- As a result of their Authorized Provider accreditation status, ICC is authorized to offer IACET CEUs for its programs that qualify under the ANSI/IACET Standard.
- You will obtain full CEUs for this course, if you actively participate in the training activities and stay for the entire session. Evidence of this will be the sign out sheet.
What is Non Potable Water?

Non-Potable Water Revisited

- **Ch. 4 – Site Development and Land Use**
  - 404 – Landscape Irrigation and Outdoor Fountains

- **Ch. 7 – Water Resource Conservation, Quality and Efficiency**
  - 706 – Nonpotable Water Requirements
  - 707 – Rainwater Collection and Distribution Systems
  - 708 – Gray Water Systems
  - 709 – Reclaimed Water Systems
  - 710 – Alternate Onsite Nonpotable Water Systems

- **Appendix A – Project Electives**
  - A107 – Water Resource Conservation and Efficiency
**Non-Potable Water in the IPC**

**2009**
- Chapter 6: Water Supply & Distribution
- Appendix C: Gray Water Recycling Systems

**2012**
- Chapter 6: Water Supply & Distribution
- Chapter 13: Gray Water Recycling Systems

**2015**
- Chapter 6: Water Supply & Distribution
- Chapter 13: Nonpotable Water Systems
- Chapter 14: Subsurface Landscape Irrigation Systems

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**Organization of Chapter 13: Nonpotable Water Provisions in the 2015 IPC**

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**301 General**

- Addresses provisions applicable to most non-potable water systems.
- 13011 Scope. The provisions of Chapter 13 shall govern the materials, design, construction and installation of systems for the collection, storage, treatment and distribution of nonpotable water.
  - Key Point: The use and application of nonpotable water shall comply with laws, rules and ordinances applicable in the jurisdictions.
  - No non-potable water regulations at the federal level. Any regulations around usage, quality, testing, etc are at the state or local level.
1301.2 Water Quality

- Must meet the minimum water quality requirements for the application by all AHJs in the jurisdiction.
- Two objectives:
  - Primary: Protect health, safety
  - Secondary: Preserve function of the POU device.
- < 4 mg/L chloramines, free chlorine (ASTM D1253)
- No undissolved ozone*
- Min. 100 micron filtration for flushing*

1301.3 Signage Required

- Identification required at nonpotable water outlets.
- "Caution: Nonpotable water. DO NOT DRINK."
- Figure 1301.3 pictograph.
- Be aware of local signage requirements – colors, languages, symbols.

1301.5-1301.8 Basic Health and Safety Provisions

- 1301.5 Potable water connections – Protect any potable water connections from backflow per Section 608.
- 1301.6 Approved components and materials.
  - Materials must be approved for intended applications.
  - Compatible with disinfection & treatment systems.
- 1301.7 Insect and vermin control – Prevent entrance of insects and vermin into the system.
- 1301.8 Freeze protection – Protect tank and systems and piping from freezing where necessary.
1301.9 Nonpotable Water Storage Tanks

- Sizing
- Location
- Materials
- Foundation/Supports
- Makeup Water
- Access
- Overflow

- Venting
- Draining
- Marking and Signage
- Testing
- Abandonment

1301.9 Tanks – Sizing/Location

- Sizing – Must be sized in accordance with anticipated demand.
- Location – Protect tanks from direct sunlight to prevent algae growth.
  - Opaque
  - Shaded
  - Underground

1301.9 Tanks – Materials, Supports

- Materials – Durable, non-absorbent, corrosion resistant.
  - Compatible with any disinfection system.
  - UV resistant aboveground.
- Foundation, Support.
  - Support per IBC
  - Underground ballast to resist buoyancy
  - Underground tanks to withstand earth and surface loads.

1301.9 Tanks - Features

- Makeup Water (1301.9.5)
- Access (1301.9.7)
- Vent (1301.9.8)
- Overflow (1301.9.6)
- Stormwater Discharge
- Inlet (Floating Inlet shown, but not required)
1301.9.9 Draining of Tanks

- Drain NOT required
  - If needed, may use pump or drain at lowest point in tank.
- Drain discharge per stormwater disposal requirements.
- Sizing per 606.5.7
- At least one cleanout required.

1301.9.10 Marking and Signage

- Label each nonpotable storage tank:
  - “CAUTION: NONPOTABLE WATER – DO NOT DRINK”
- Where opening could allow entry:
  - “DANGER – CONFINED SPACE”

1301.9.11 Storage Tank Tests

- Fill to level of overflow
  - Hold for 24 hours, inspect for leaks
- Introduce makeup water and verify overflow operation.
  - Verify proper automatic shutoff of makeup.

1301.10-12 Tanks – Misc.

- 1301.10 System abandonment
  - Remove or disable piping
  - Connect potable supply to distribution piping.
  - Seal, lock or fill tank.
- 1301.12 Outdoor outlet access
  - Hose bibs, sillcocks, yard hydrants unavailable to public
  - Locked vault or special key
- 1301.11 Trenching requirements
  - Separate nonpotable piping from potable and sewer piping by 5’
  - Exceptions:
    - Where cleaner water at least 12’ above.
    - Horizontal crossing, sleeved.
    - Irrigation downstream of backflow preventer.
Onsite Water Reuse Systems (Graywater)

- Lightly contaminated wastewater collected from fixtures for reuse.
- Excludes wastewater containing fecal matter, food waste (blackwater).
- Graywater may be used for many applications (depending on local regulations)
  - Subsurface irrigation (usually untreated)
  - Flushing
  - Irrigation
  - Water features
  - Fire suppression

202 Definitions: Onsite Nonpotable Water Reuse Systems

ONSITE NONPOTABLE WATER REUSE SYSTEMS. Water systems for the collection, treatment, storage, distribution, and reuse of nonpotable water generated onsite, including but not limited to graywater systems. This definition does not include rainwater harvesting systems.

- Swimming pool and other filter backwash
- AC/Steam/Boiler condensate
- Foundation drainwater
- Graywater

202 Definitions: Graywater

- IPC: Graywater
- IGCC: Graywater
- ASHRAE 189.1: Graywater
- UPC: Gray water
- NSPC: Graywater
- Canada: Greywater
- Australia: Greywater

ONSITE NONPOTABLE WATER REUSE SYSTEMS. Water systems for the collection, treatment, storage, distribution, and reuse of nonpotable water generated onsite, including but not limited to graywater systems. This definition does not include rainwater harvesting systems.

- NOT Potable
- But…
- NOT Blackwater
What’s in the water?

- Bacteria
- Viruses
- Protozoa
- Enzymes
- Nitrates
- Oil
- Phosphates
- Salts
- Bleach
- Surfactants
- Dyes
- Grit
- Lint
- Foam
- Hair

How does it compare to wastewater?

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Graywater</th>
<th>Wastewater</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suspended Solids (mg/L)</td>
<td>45–330</td>
<td>100–500</td>
</tr>
<tr>
<td>BOD₅ (mg/L)</td>
<td>90–290</td>
<td>100–500</td>
</tr>
<tr>
<td>pH</td>
<td>6.6–8.7</td>
<td>6.5–8.5</td>
</tr>
<tr>
<td>Nitrite (mg/L)</td>
<td>&lt;0.1–0.8</td>
<td>1–10</td>
</tr>
<tr>
<td>Ammonia (mg/L)</td>
<td>&lt;1.0–25.4</td>
<td>10–30</td>
</tr>
<tr>
<td>Total Coliform (CFU/100 mL)</td>
<td>10⁶–10⁷</td>
<td>10⁸–10⁹</td>
</tr>
<tr>
<td>E. Coli (CFU/100 mL)</td>
<td>10⁶–10⁷</td>
<td>10⁸–10⁹</td>
</tr>
</tbody>
</table>


301.3 Connections to Drainage

301.3 Connections to drainage system. Plumbing fixtures, drains, appurtenances and appliances used to receive or discharge liquid wastes or sewage shall be directly connected to the sanitary drainage system of the building or premises, in accordance with the requirements of this code. This section shall not be construed to prevent indirect waste systems required by Chapter 8.

Exception: Bathtubs, showers, lavatories, clothes washers and laundry trays shall not be required to discharge to the sanitary drainage system where such fixtures discharge to an approved system in accordance with Chapter 13 and 14 gray water system for flushing of water closets and urinals or for subsurface landscape irrigation.

1302.2 Sources

<table>
<thead>
<tr>
<th>Permitted</th>
<th>Prohibited</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bathtubs, showers</td>
<td>Blackwater</td>
</tr>
<tr>
<td>Lavatory faucets</td>
<td>RO Reject water</td>
</tr>
<tr>
<td>Clothes washers, laundry trays</td>
<td>Water softener discharge</td>
</tr>
<tr>
<td>Swimming pool backwash</td>
<td>Kitchen sink, dishwasher water</td>
</tr>
<tr>
<td>AC, steam condensate</td>
<td>Wet hood scrubber water</td>
</tr>
<tr>
<td>Rainwater</td>
<td>NOTE: Sources must be approved for collection</td>
</tr>
<tr>
<td>Cooling tower blow-down</td>
<td>and reuse by jurisdiction.</td>
</tr>
<tr>
<td>Condensate drain water</td>
<td></td>
</tr>
<tr>
<td>Fluid cooler discharge</td>
<td></td>
</tr>
<tr>
<td>Food steamer discharge</td>
<td></td>
</tr>
<tr>
<td>Fire pump test water</td>
<td></td>
</tr>
</tbody>
</table>

1302.5-6 Filtration, Disinfection and Treatment

- Disinfection, treatment per end use specifications, local requirements
  - Untreated graywater cannot be stored longer than 24 hours
  - Use of dye injector is NO LONGER REQUIRED.
- Graywater used for flushing must comply with NSF 350.
- Filtration per intended end use.
  - Isolation valves, differential pressure gage required for all filters.

1302.4 Collection Piping

Collection
- Use DWV piping, fittings, joints.
- No special marking.
- Size per Section 710.

Distribution
- Use distribution piping materials, joints per Section 605.
- Mark per Section 608.8:
  - “CAUTION: NONPOTABLE WATER – DO NOT DRINK”
  - Purple color or purple tape or wrap.
  - Direction of flow.
  - Repeat on 25’ intervals.
- Size per Section 604.

NSF 350 – Onsite Residential and Commercial Water Reuse Treatment Systems

- Scope: Onsite residential and light commercial approx up to 1500 gal/d treatment capacity
  - Specifies different artificial influent challenge water criteria depending on whether single or multiple source is intended.
  - Applications include nonpotable restricted and unrestricted indoors and outdoors (single criteria).
- 26 week testing using standardized artificial challenge water under several loading scenarios.

Status
- Ballot released September 21, public comment in Fall 2010
- Release in early/mid 2011

Integrated Systems - Packaged Onsite Graywater Systems

- Integrated “appliances” eliminate the need for engineered systems
  - Reduced need for specialized installer skills
  - Control units integrate disinfection, monitoring, alarms/notifications
- Standards under development to address water quality, system features, and maintenance
  - NSF 350 – Residential Wastewater Treatment Systems
  - CSA B128.3 Performance of Non-Potable Treatment Systems
1302.7-8 Storage tanks and Valves

- Tanks – requirements in addition to those in 1301.
  - Location restrictions based on proximity to lot line, seepage pits, septic systems, streams, lakes, etc.
  - Apply with IBC and tank standards from AWWA, UL or API as appropriate.
  - Outlets > 4” above bottom

- Valves
  - Three-way diverter valve required on inlet piping
  - Backwater valve required on overflow and drains per Section 715.

1302.12 Tests and inspections

- Collection piping: Per Section 312
- Storage tanks: Per Section 1301
- Makeup water system piping: Per Section 312
- Backflow preventers: Per Section 312.10
- Vermin & insect protection: Per Section 1301
- Water Quality: Per jurisdiction.

Nonpotable Rainwater Collection and Distribution Systems

“Irrigation of the land with seawater desalinated by fusion power is ancient. It's called rain.”
Michael McClary
1303.1 General

1303.1 General. The provisions of Section 1303 shall govern the construction, installation, alteration and repair of rainwater collection and conveyance systems for the collection, storage, treatment and distribution of rainwater for nonpotable applications, as permitted by the jurisdiction.

202 Definitions Related to Rainwater

- **RAINWATER.** Water from natural precipitation.
- **RAINWATER COLLECTION AND CONVEYANCE SYSTEM.** Rainwater collection system components extending between the collection surface and the storage tank that convey collected rainwater, usually through a gravity system.
- **Roof Washer**
- **Potable, Nonpotable Water**
- **Storage tank**
- **Collection piping**
- **Backwater valves**
- **Leader**

1303.1 Collection Surfaces

Collection of rainwater from above-ground impervious roofing surfaces using approved materials.

- Exception: Vehicle and parking surfaces permitted for collection if water used exclusively for landscape irrigation.

Prohibits collection of overflow and bleed-off discharge from roof-mounted appliances.
1303.3 Debris Excluders

- Debris excluders (or equivalent) required.
  - Required to be self-cleaning.
  - Coarse filter to prevent introduction of large material such as leaves, sticks, etc.

1303.4 Roof Washers (First-Flush Diverters).

- Diversion of small quantity of initial volume collected from each rain event.
  - Most contaminated water prevented from entering the tank.
  - Required volume subject to local conditions.
  - Automatic draining, cannot drain to collection surface.
  - Discharge to be handled as stormwater, cannot drain to sanitary sewer.
  - Must be accessible for maintenance.

1303.5-7 Collection Systems

- Roof gutters and downspouts
  - Slope of 1/8”/foot minimum, except siphonic roof drain systems
  - Materials compatible with roofing.
- Collection pipe
  - Utilize DWV piping, fittings, and joints.
  - Sizing as DWV in IPC 710 and IPC Chapter 11- Storm Drainage, which uses 100-year, 1-hour rainfall rates.
  - No special labeling.

1303.8-9 Treatment

Filtration

- First stage of filtration debris excluder – coarse filter.
- Filter in accordance with end use.
  - IgCC A107.4.2: 100 microns for urinal or water closet flushing.
  - Consult end-use devices, health code requirements.
- Accessible for maintenance/inspection
- Upstream/downstream isolation valves
- Differential pressure gage or similar to determine loading.

Disinfection/Treatment

- Disinfect in accordance with end use – per local health code or point of use device requirements.
- Options include chlorine, chloramine, UV, ozone, membrane filtration (and combination).
- Chlorine requires residual testing per ASTM D1253.
  - IgCC A107.4.1:4 mg/L chlorine or chloramines max, no unabsorbed high concentration ozone.
1303.10 Storage tanks

A fixed container for holding water at atmospheric pressure for subsequent use as part of a plumbing or irrigation system.
- Comply with IPC Section 1301.9 – Nonpotable Water Storage Tanks
- Rainwater-specific location restrictions - protected trees, lot lines, seepage pits, septic tanks.
  - Inlets - avoid agitating tank inlets (quiescent)
  - Outlets – at least 4” above bottom, non-skimming.

1301.12 Pumping and Control System

- Mechanical equipment easily accessible and removable.
- Minimum flowrate and pressure per application and plumbing code.
- Pressure reducing valve for pressures >80 psi

707.11.12 Distribution Pipe

- Design and materials per IPC 604 and 605 for nonpotable or potable as applicable.
- Marking and identification per IPC 608.8 or IgCC 707.11.12.4
  - “CAUTION: NONPOTABLE WATER – DO NOT DRINK”
  - Embossed, stamped, integrally stamped or marked
  - Purple color – integral or tape (exception outdoors, downstream of a backflow preventer).

1301.3 Point of Use Marking

- Nonpotable outlet marking required with a sign.
- Sign text: “Nonpotable water is utilized for [application name]. Caution: Nonpotable water. DO NOT DRINK”
1302.12 Tests & Inspections

- Collection pipe and vent tests
  - Includes roof gutters and roofwashers
- Storage tank tests and inspections
  - Leakage and overflow function
  - Makeup water system function
- Water supply system tests.
- Backflow preventer testing.
- Vermin and insect protection inspection.
- Water quality test (point of use).

1303.16 Operations and Maintenance Manuals

- Detailed operations and maintenance manuals, schematics
- Maintenance procedures
  - Consumable parts and part numbers
  - Startup and shutdown procedures.

Potential Applications for Rainwater

- Potential Applications
  - Toilet/Urinal flushing
  - Irrigation
  - Trap priming
  - Cooling towers
  - Fire sprinklers
  - Ornamental fountains & water features
  - Potable (only addressed in the IgCC)

- Water quality
  - Largely set by intended use, local ordinances
  - Limited code provisions for some applications
    - Flushing, irrigation, fire sprinklers, etc.

Reclaimed Water Distribution Systems

- General
- Onsite Water Reuse
- Reclaimed Water
- Rainwater Collection & Dist.
Section 202 Definitions: Reclaimed Water

RECLAIMED WATER. Non-potable water that has been derived from the treatment of wastewater by a facility or system licensed or permitted to produce water meeting the jurisdiction’s water requirements for its intended uses. Also known as “Recycled Water.”

Source: Charlotte Pipe

1304 Reclaimed Water Systems

- Design, installation, materials, joints per existing code requirements.
  - Pressure regulation to < 80 PSI (1304.2)
  - Design per ASTM E 2635
  - Irrigation piping downstream of backflow preventer exempted (1304.3)

- Marking
  - Distribution piping marking/labeling per 608.8

- Testing
  - Water supply testing per 312.5
  - Backflow preventer testing per 312.10

Conclusion

- 2015 IPC and IRC to be released in June, 2014. Will each contain newly updated provisions for non-potable water collection and use.
  - IPC: New Chapter 13: Nonpotable Water Systems
  - Builds on existing material in the IPC for graywater, non-potable water piping; and tank provisions from the IBC.

- Critical to be aware of local requirements, regulations, restrictions on the use of non-potable water from:
  - Health Departments
  - Water Authorities
Rainwater Collection System Standard Project

- Joint project by CSA and ICC to develop ANSI and SCC standard for rainwater collection system.
  - For use in U.S. and Canada
  - Project website at www.iccsafe.org/IS-RCSDI
  - Committee named late 2013, first Consensus Committee Meeting April, 2014.
- Scope
  - Design, installation, maintenance.
  - Systems intended to collect, store, treat, distribute, utilize rainwater.
  - Potable and non-potable applications.

Questions?

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- Director, PMG Activities
- International Code Council
- smartin@iccsafe.org
Always include activity

- You can provide Test Your Knowledge review questions or another activity at the end of topics and the end of the training.
- This will help the learners to remember the content presented.

Final Reflection

- This slide will help the learner to reflect on the day and what they will take back to the job and apply.

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