

Redesigning Water Loss Standards in California

Using the New IWA Methodology

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- 35 million population, 50 million by 2030
- Systems highly fragmented: up to 8,500 individual public water systems
- 480 systems > 3,000 connections
- 175 systems >10,000 connections, serving 90% of population
- ~ 9 Million connections in 2004

- 848 million cubic meters urban water supply
- 432 million cubic meters agricultural water supply
- 382 million cubic meters recycled water

TOTAL: 1,662 million cubic meters

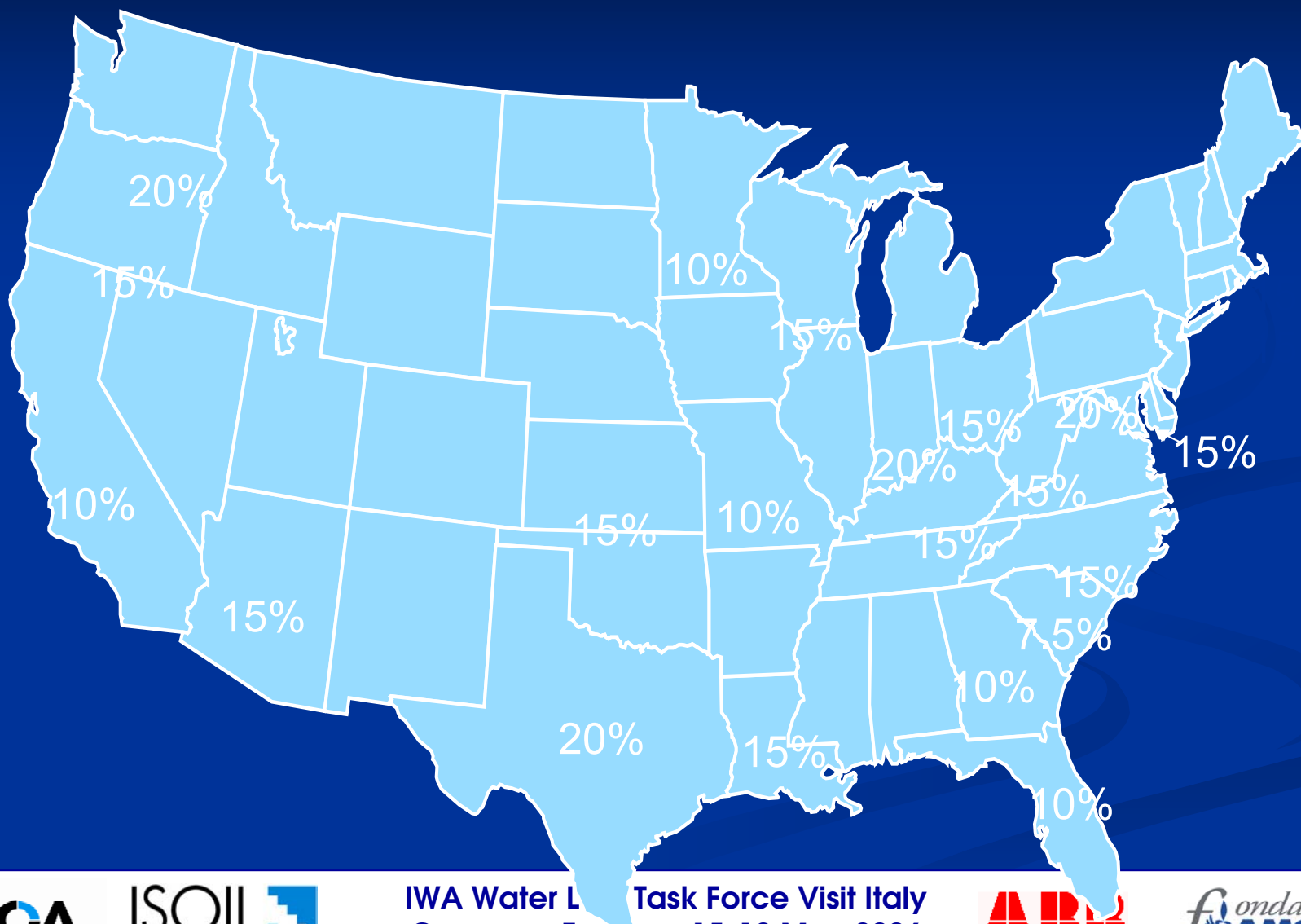
California no different than rest of the US:

- Political infeasibility of admitting system leakage
- Falsifying water accounting records
- Inherent mistrust of anyone outside utility examining system
- Lack of recognition of economic value of recovery

- Negotiated Memorandum of Understanding signed December 11, 1991
- Currently **354** signatories:
 - **214** water agencies (80% of water supplied statewide)
 - **31** environmental groups
 - **124** “other”
- Signers pledge “good faith effort” to implement BMPs that are cost-effective
- MOU created Council as governing body

- State of the art conservation programs
- 14 BMPs, covering residential, commercial, industrial, institutional, and large landscape
- Constant revision to reflect new technologies and conditions
- Results reported annually to state water regulatory agency
- BMP 3 governs “System water audits, leak detection and repair”

- Required every two years
- Web-enabled database
- 188 utilities reported for 2003-2004 years
- Results reported to state regulatory agency
- Total retail customer connections
 - Minimum number 0 (wholesalers)
 - Average number 28,000
 - Median of data set 14,000
 - Maximum number 677,000



- Has not been revised since 1991
- A two-step process, with a screening audit based on the old methods
- A detailed audit required if UFW is higher than 10%, based on old M36 Manual
- No data validation currently required
- Copies of detailed audits not currently required

- Out of date, incorrectly utilized, ignored
- BMP 3 now being revised to meet standard IWA and AWWA best practice:
 - encompass all components of water loss
 - establish the business case for water loss control
 - compare performance in a standard manner using approved performance indicators
 - set meaningful targets for reduction of water loss throughout California
 - incorporate data validation into the process

System Input Volume	Authorized Consumption	Billed Authorized Consumption	Billed Metered Consumption	Revenue Water
			Billed Unmetered Consumption	
		Unbilled Authorized Consumption	Unbilled Metered Consumption	Non Revenue Water
		Unbilled Unmetered Consumption		
	Water Losses	Apparent Losses	Unauthorized Consumption	
			Customer Meter Inaccuracies	
		Real Losses	Leakage on Transmission and Distribution Mains	
	Leakage and Overflows at Storage Tanks			
	Leakage on Service Connections up to point of Customer Meter			

1. Conduct California case study audits.
2. Review 52 detailed M36 audits and convert to new terminology.
3. Rewrite the current reporting requirements for documentation.
4. Collect current data from water utilities using the new reporting parameters.
5. Determine appropriate combination of metrics for statewide compliance standard.

6. Develop water valuation standard.
7. Draft new BMP language.
8. Submit the new language for adoption.
9. Conduct training, training, and more training!
10. Implement new program and embed standards in regulatory process.

- **Screening audits:**
 - Los Angeles Department of Water and Power (677,000 connections)
 - Lake Arrowhead Community Services District (7,800 connections)
- **Full comprehensive audits with ELL analysis and some pilot implementation:**
 - El Dorado Irrigation District (33,218 connections)
 - San Francisco Public Utilities Commission (170,000 connections)
- **Apply results to BMP 3 revision analysis and AWWARF 2928**

- Need to improve data validation of key components
- 113-151 liters/con/day of apparent loss
- LADWP has approximately 170 liters/con/day of real loss with a range from 68 to 302
- EID has approximately 340 liters/con/day of real loss with a range from 151 to 568
- Both utilities have high pressure
- Both utilities have an ILI in the range of 2

- 2003-2004 Reporting Year
- 188 utilities reported
- 52 full system water audits
- Convert to new terminology
- Plot utility performance
- Benchmark utility ILI and volume parameters

- New documentation requirements being approved now
- Voluntary vs. mandatory reporting
- New reporting questions:
 - Volumes
 - Infrastructure and hydraulics
 - Maintenance questions
- In effect for 2005-2006 Reporting Year

- Water supplied to the system
- Water exported from the system
- Billed authorized metered consumption
- Billed authorized un-metered consumption
- Unbilled authorized metered consumption
- Unbilled authorized un-metered consumption

- System input (source or master meter) volumes
- Miles of mains
- % of rigid pipe
- Number of service connections (accounts)
- % of service connections in rigid pipes
- Number and % of residential unmetered service connections

- Estimate of customer meter under registration
- Estimate of average distance from curb-stop to customer meter (or first point of consumption)
- Average pressure and range of pressures
- % of the system fed from gravity feed
- % of the system fed by pumping and re pumping

- What frequencies are used for testing, repair and replacement for different meter sizes or customer categories
- Proactive search for leaks using leak survey techniques or reactive repair of leaks only?

- Set target ranges for Infrastructure Leakage Index
- Adopt additional volume-based parameters for benchmarking
- Set schedule for target compliance within 10-year time frame of BMP 3
- Coordinate targets with regulatory processes

- MOU requires business case analysis (“cost-effectiveness”)
- Avoided utility cost the beginning point
- New supply incremental cost in areas of arid climates, supply shortages
- Embedded energy in water: 18% for water pumping, treatment, and distribution
- Retail price valuation for water losses raises the bar for economic levels of leakage

- Six month minimum process
- Must be approved by 2/3 of all signatories
- General support for new accounting methods among utilities
- Less supportive of a new target with a maximum value
- Tiered recognition levels a possible answer

Technical Performance Category		ILI	Physical Losses [Litres/connection/day] (when the system is pressurised) at an average pressure of:				
			10 m	20 m	30 m	40 m	50 m
Developed Countries	A	1 - 2		< 50	< 75	< 100	< 125
	B	2 - 4		50-100	75-150	100-200	125-250
	C	4 - 8		100-200	150-300	200-400	250-500
	D	> 8		> 200	> 300	> 400	> 500
Developing Countries	A	1 - 4	< 50	< 100	< 150	< 200	< 250
	B	4 - 8	50-100	100-200	150-300	200-400	250-500
	C	8 - 16	100-200	200-400	300-600	400-800	500-1000
	D	> 16	> 200	> 400	> 600	> 800	> 1000

- Detailed reporting assistance
- Business case tools
 - Revise BMP Costs and Savings Study
 - Refine methodology for valuing water correctly
 - Create spreadsheet for calculating cost-Effectiveness
- Detailed California Guidance Manual in addition to M36
- Training Programs

- ILI not sufficient alone for BMP 3 compliance
- Volumetric targets and data validation must be included in BMP 3
- Detailed audits must be filed
- California utilities a candidate for advanced pressure management (basic pressure management already in place in many areas)

- Water must be valued properly for max cost/benefit
- State grant funding should be based on PI compliance
- Bond ratings should be based on PI compliance
- Water Rights should be renewed based on PI compliance!

- George Kunkel
- Julian Thornton
- Roland Liemberger
- Ken Brothers



California
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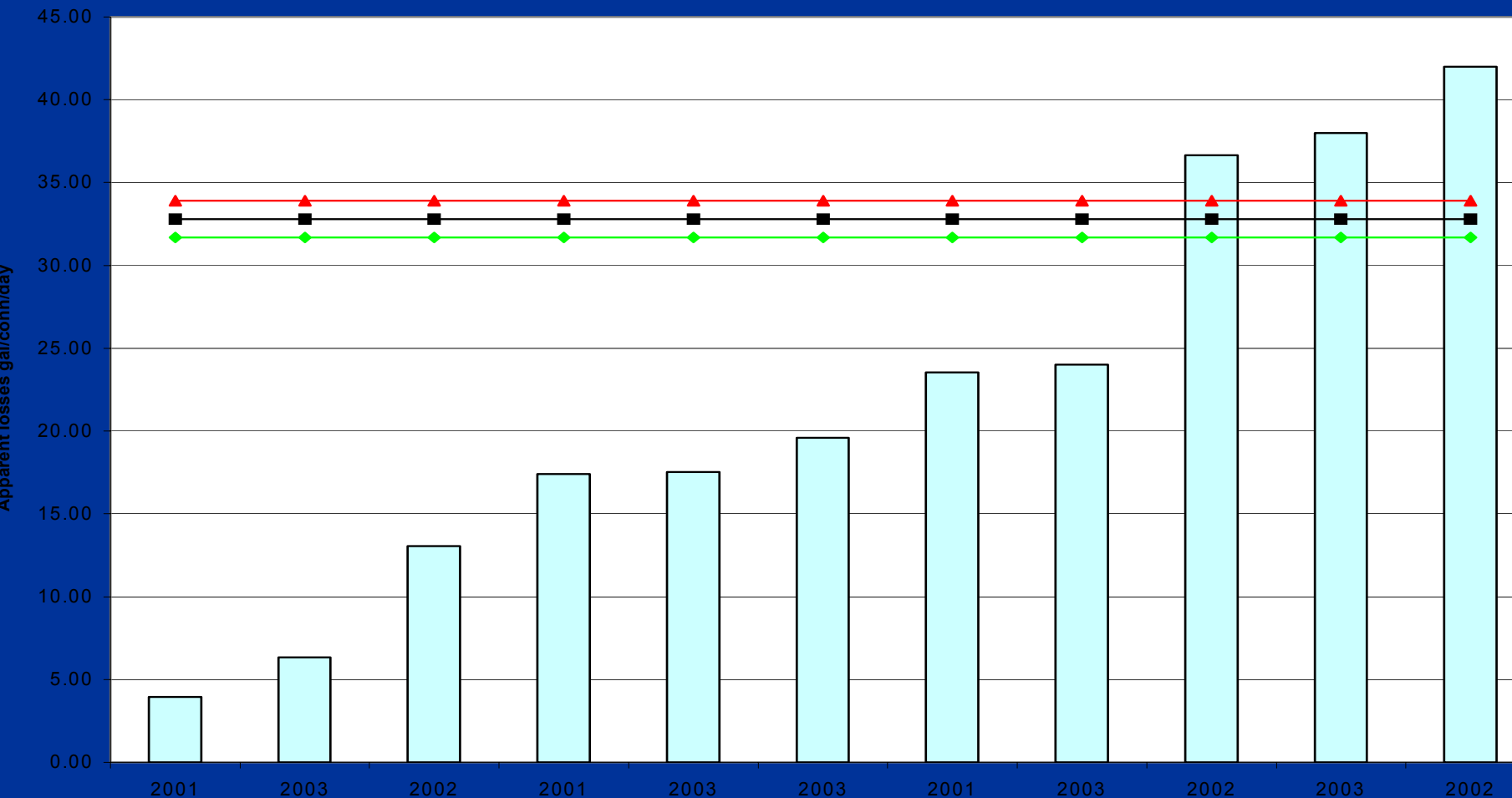
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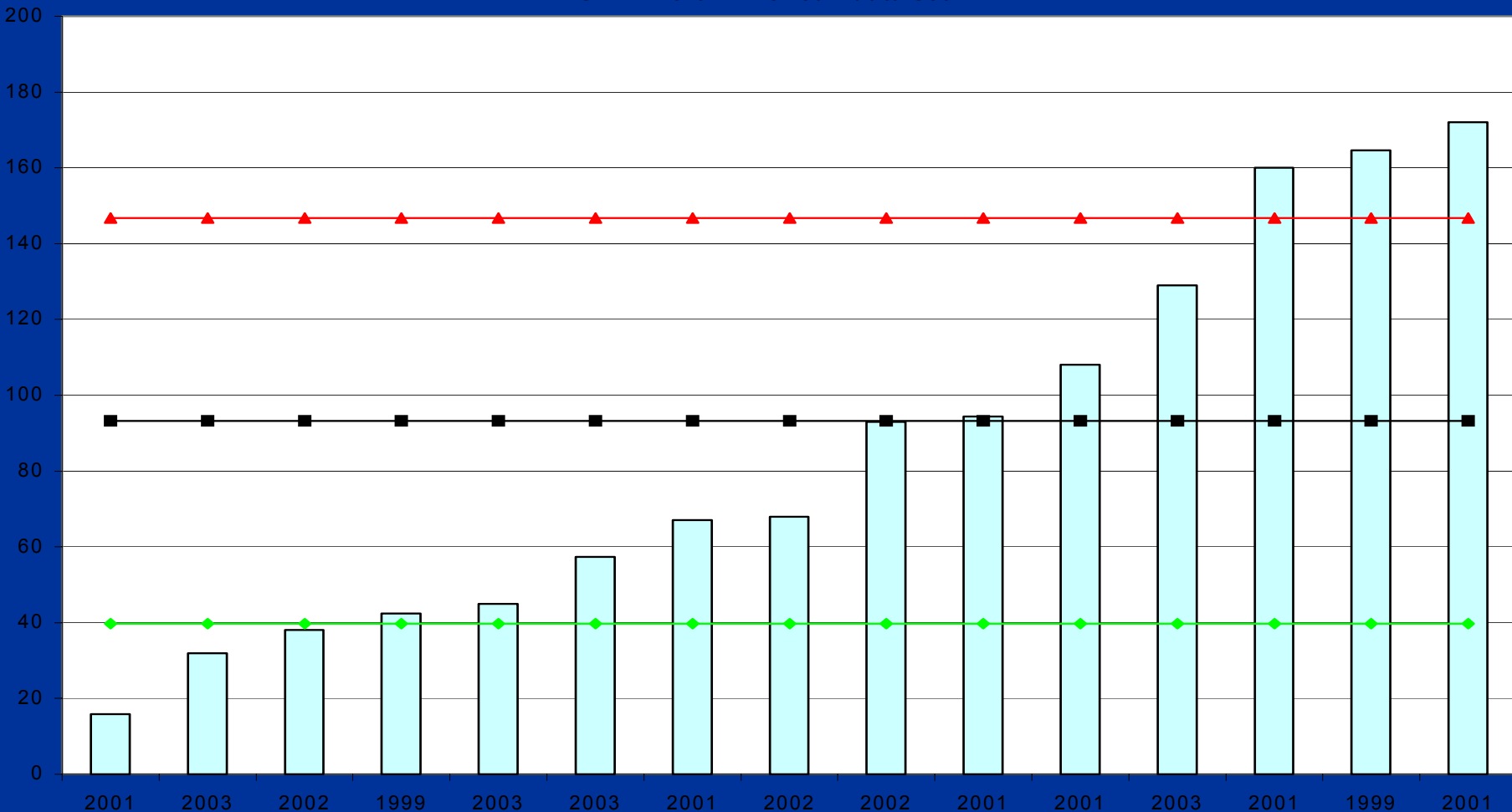
IWA Level 1 (Basic) Operational PI for Apparent Losses (Op23)

Apparent Losses as US Gallons / service connection / day

OP23 North American data set

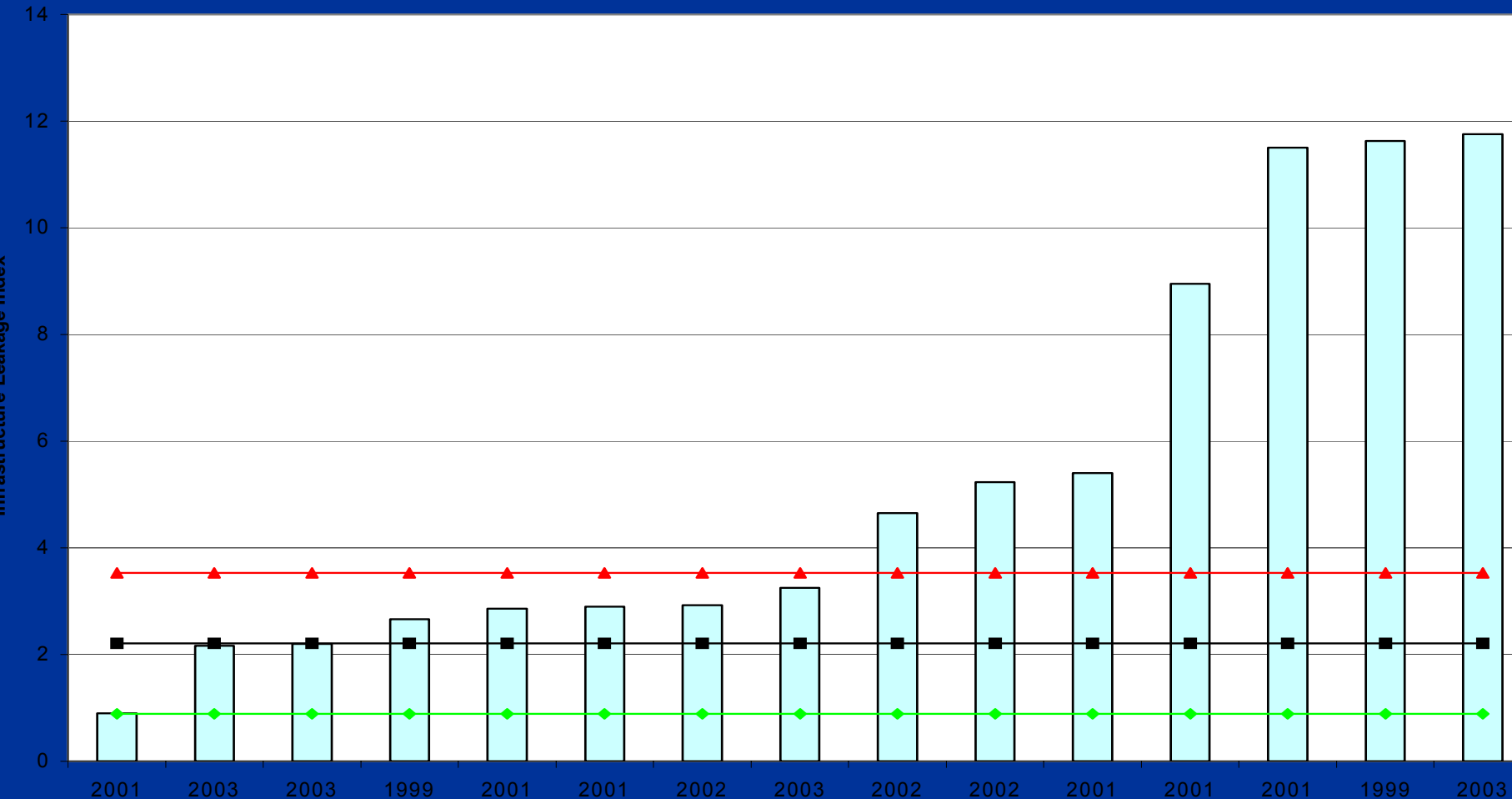


IWA Level 1 (Basic) Operational PI for Real Losses (Op24)
Real Losses as US Gallons / service connection / day
OP24 North American data set

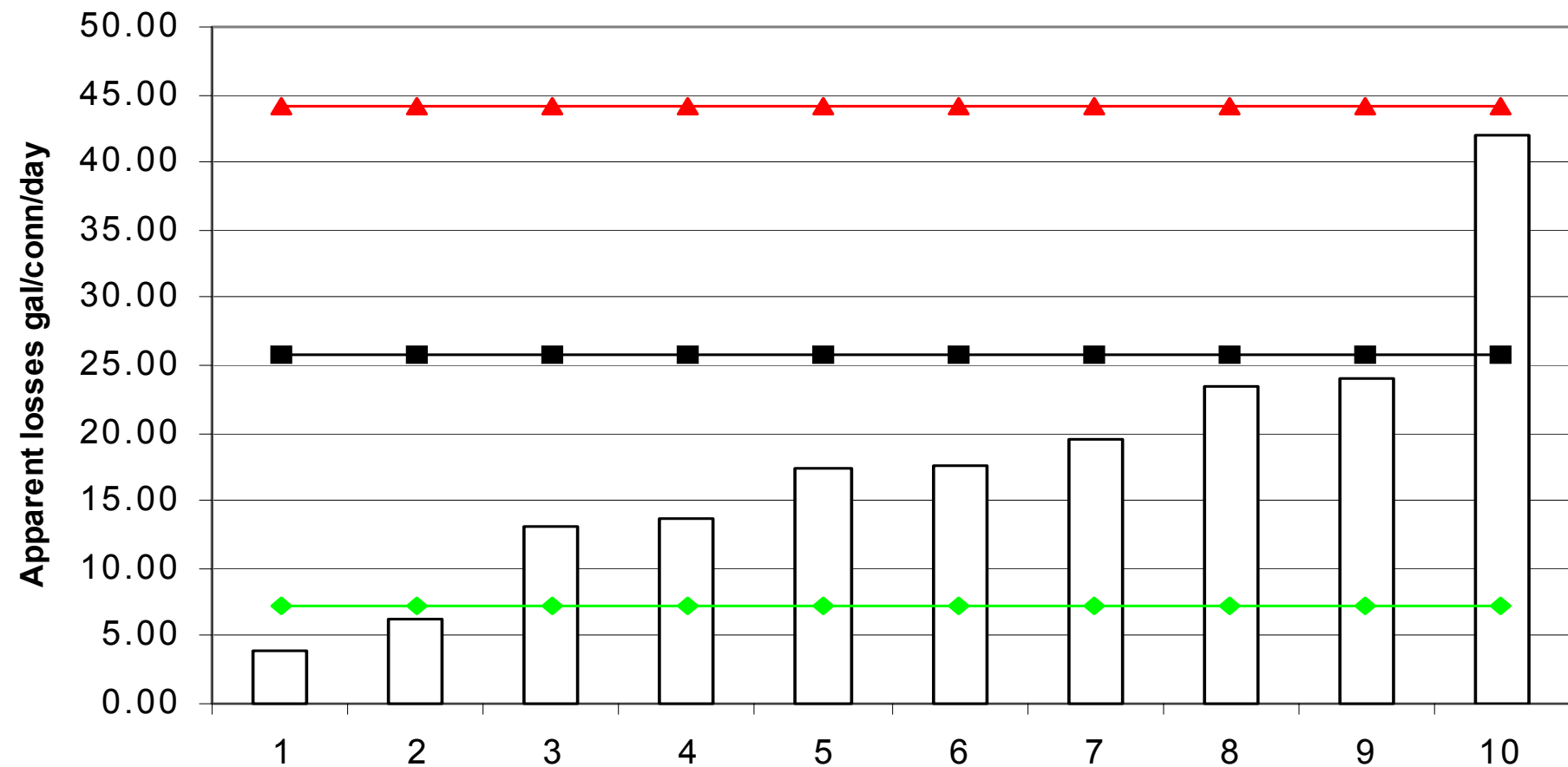


IWA Level 3 (Detailed) Operational PI for Real Losses (Op25)

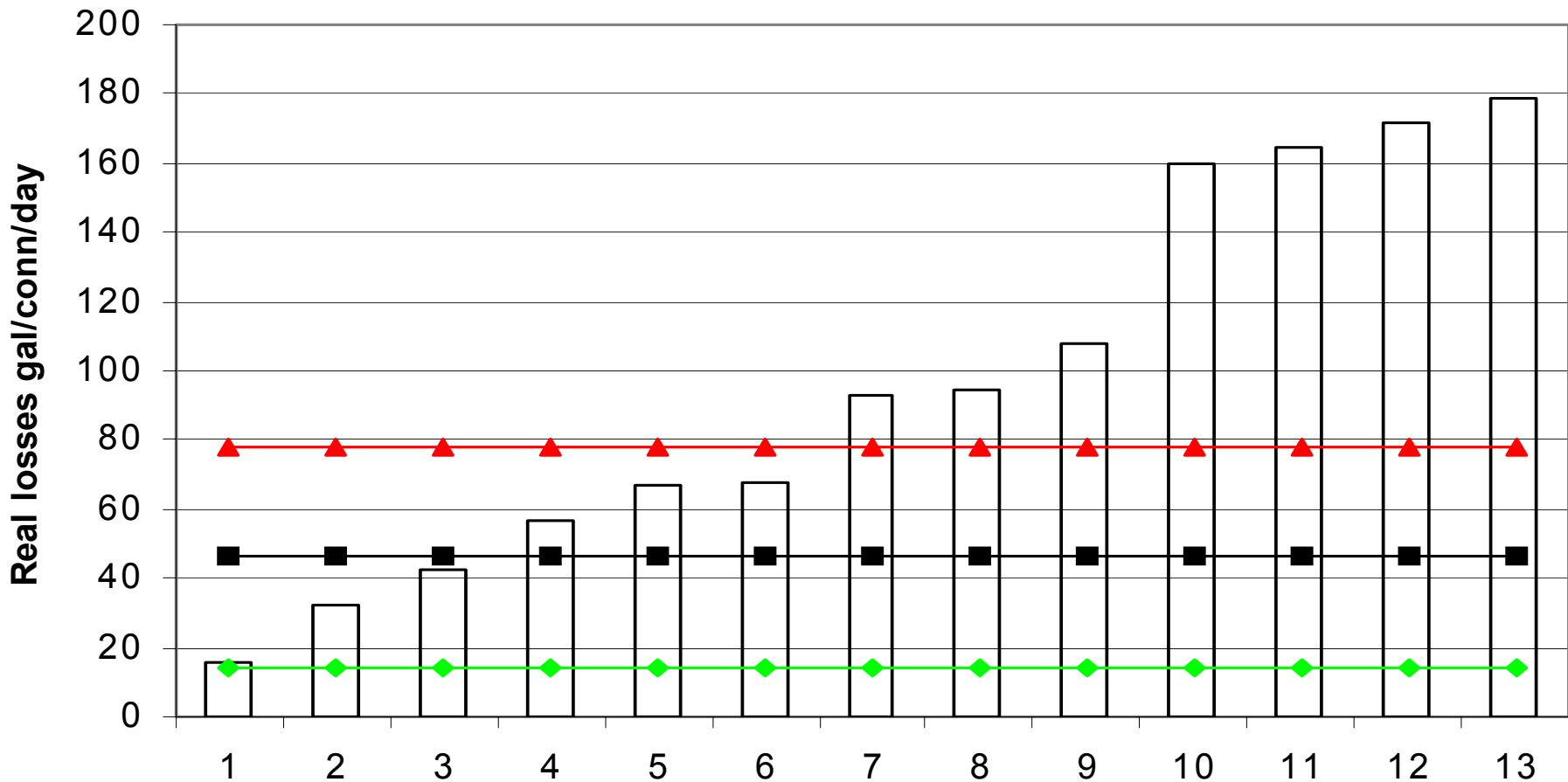
Infrastructure Leakage Index ILI
OP25 North American data set



OP23 North American data set



OP24 North American data set



OP25 North American data set

